AA-764
Severn River/Maryland Route 450 Bridge
Annapolis vicinity
public (unrestricted)

1924,1978

This bridge carries Maryland Route 450 over the Severn River on the outskirts of Annapolis, Maryland. It originally consisted of 24 steel arches, each with 70 foot span, and a 95 foot double leaf bascule span. Several of the steel arches were replaced at the northeast end by concrete structures after that portion of the bridge collapsed in 1978. The bridge house is a concrete structure located at the westernmost corner of the bascule span.

As a moveable bridge, this structure is significant as a relatively rare kind of construct, designed to accommodate both vehicular and water-borne traffic. This bridge represents one of three moveable bridges -- part of Maryland's state road system in Anne Arundel County, and one of 15 bridges of the same structural type throughout the state road network -- identified by the Maryland Historical Trust for the Maryland Department of Transportation in a jointly conducted survey during 1980-81.

AA-764

Maryland Historical Trust/ National Register of Historic Places Registration Form MHT Inventory No.

MHT Computer No. .

This form is for use in nominating or requesting determinations of eligibility for individual properties or districts. For instructions, see the Trust publication National Register Application Guidelines. Type all entries. 1. Name of Property historic name other names Severn River Bridge 2. Location not for publication street & number MD Rte 450 at Severn River |X | vicinity city, town Annapolis county Anne Arundel zio code 21401 code MD code state Maryland 3. Classification Number of Resources within Property Category of Property Ownership of Property Noncontributing Contributing building(s) · private buildings district _ public-local sites site x public-State structures structure public-Federal objects object 0 Total Number of contributing resources previously Name of related multiple property listing: listed in the National Register 0 n/a (cneck and complete the appropriate section, OWNERSHIP See Continuation Sheet X This resource has 50 or fewer owners. owner(s): State of Maryland Maryland Department of Transportation State Highway Administration 301 W. Preston Street Baltimore, MD 21201 ATTN: Mr. Louis Ege, Jr. Chief, Division of Project Planning date this information was collected: ___ This resource has more than 50 owners. date this determination was made: RESERVED (leave this space blank) MARYLAND HISTORICAL TRUST

MARYLAND HISTORICAL TRUST DHCP/DHCD 100 COMMUNITY PLACE CROWNSVILLE, MD 21032-2023 301-514-7600

National Register Administrator Maryland Historical Trust Shaw House 21 State Circle Annapolis, Maryland 21401

MHT Inventory No.: AA-764
Current Functions (enter categories from instructions) Transportation/Road Related
Materials (enter categories from instructions)
Materials (enter categories from instructions)
foundation Concrete (reinforced)
wallsConcrete (reinforced)
roofn/a
other steel drawbridge span
Other

DESCRIPTION SUMMARY:

This bridge, constructed from 1922-1924, carries MD 450 over the Severn River at Annapolis, Maryland. The 1850'-long bridge is composed of a double-leaf articulated underneath counterweight Strauss trunnion deck plate girder main span measuring 95'long, and 24 cantilevered concreteencased steel deck truss arched approach spans supported on concrete pier bents and concrete trunnion piers. There are twelve 140' sections each supported by two of the piers; from each pier rises a full arch and a half arch. The bridge is a total of 35' wide: two 12' lanes and two The four easternmost original spans were cantilevered 5' sidewalks. There is a concrete replaced in 1978 with simple steel beam spans. square-plan tender's house at each end of the bascule span, in a Neo-Classical style a with copper roof, an arched Neo-Classical inspired balustrade along both sides of the approach spans, and two concrete pylons at the westernmost end. A Maryland Historical Trust survey completed in 1980 classified the bridge as being in good and unaltered condition.

Maryland Historical Trust/ National Register of Historic Places Continuation Sheet name of 1

name of property: Severn River Bridge

Section number ____7 Page _2___

GENERAL DESCRIPTION

This bridge, constructed between 1922-1924, carries MD 450 over the Severn River at Annapolis, Maryland. The 1850'-long bridge is composed of a double-leaf articulated underneath counterweight Strauss trunnion deck plate girder main span measuring 95'long, and 24 cantilevered concrete-encased steel deck truss arched approach spans supported on concrete pier bents and concrete trunnion piers. There are twelve 140' sections each supported by two of the piers; from each pier rises a full arch and a half arch. The bridge is a total of 35' wide: two 12' lanes and two cantilevered 5' sidewalks. The four easternmost original spans were replaced in 1978 with simple steel beam spans. There is a concrete square-plan tender's house at each end of the bascule span, in a Neo-Classical style a with copper roof, an arched Neo-Classical inspired balustrade along both sides of the approach spans, and two concrete A Maryland Historical Trust survey pylons at the westernmost end. completed in 1980 classified the bridge as being in good and unaltered condition. The largest and best-preserved example of a patented Strauss trunnion bascule bridge in the state of Maryland, the 1922-1924 Severn River Bridge at Annapolis survives in a remarkably complete state of preservation, appearing and operating much as it did in June of 1924 when it was put into service.

Strauss reasoned that if, unlike the traditional trunnion bridge, which operated like a seesaw and moved in a vertical plane on a horizontal steel pivot, the entire weight of the counterweight could be concentrated at the end (tail) of the moveable leaf, it would then be possible to use a lighter counterweight. Such an arrangement also meant a shorter tail end to the leaf, thus saving on materials such that the "counterweight could be made in such shape that no pit is required to receive it when the leave is in the upright position." (Waddell, p. 704). The patented linkage, or arms, ensures that the counterweight will always move in a series of parallel positions and thus maintain the position of the weight at the tail end of the leaf.

With the exception of some details of the east abutments, the four easternmost approach spans, the windows in the westerly operators house, and a gunited finish added to the operators house in 1933 (replacing the original stucco that lasted on the hollow-tile building for only about ten years), the bridge survives as built.

A.G. Lichtenstein & Associates, a consulting engineering firm with a specialty in the evaluation and restoration of historic bridges, inspected the bridge in October and November 1991. The bridge still operates as built in 1922-24, and enjoys integrity of location, design, setting, materials, workmanship, and association. With the exception of

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Maryland Historical Trust/ National Register of Historic Places Continuation Sheet name of

MHT Inventory No.

name of property: Severn River Bridge

Section number ____7 Page __3

the 1978 replacement of the four easternmost approach spans with simple steel beam spans supported on concrete pier bents, most work to the original fabric has been inkind or nearly inkind repair and/or replacement that is neither intrusive in appearance nor compromises the integrity of the original design, and is more accurately identified as maintenance repairs rather than alterations (Lichtenstein inspection).

A physical inspection of the bascule spans and operating mechanism by mechanical engineer George Perkons, P.E. of Lichtenstein & Associates in November, 1991 led him to conclude that the "operating system has not been changed" and that "all machinery parts are original or inkind replacements, but they show considerable wear." (Perkons, 11/19/91). Each leaf with articulated counterweights under the approach spans is operated by machinery located on the concrete bascule piers. western counterweight and steel frame are 1966 inkind replacements of The operating machinery of each leaf consists of an the original. electric motor and brake which drive two rack pinions through the six sets of open reduction gears, transverse shafts, and couplings and bearings mounted on the structural steel supports (columns) attached to the bascule piers. Deteriorated portions of the bottoms of the rivetconnected trunnion towers and machinery support beams were repaired with both inkind and welded replacements in 1978, 1986, and 1989, according $_{\infty}$ to the State Highway Administration (SHA). Each rack pinion engages a segmental rack which is attached to the bottom flange of the bascule Each leaf drive is equipped with a machinery brake m deck girder. s operated electrically by a solenoid. The drive shaft for the manual opening of the bridge has been removed, but the original jaw-type locks and operating machinery remain and are still functioning. (Perkons, 11/19/91).

Controls for operating the bridge are, and always were, located in the operator's house adjacent to the west leaf. The manual trolley-like bridge operation controls (one per leaf) appear to be original. A push-button relay panel that controls the sequential operation was added in 1975. It is likely that the bridge has always had limit switches to protect against opening a leaf beyond its intended limits. (Perkons, 11/19/91).

There have been minor alterations/modifications to the structure, including bypassing the original manual opening mechanism, limited welded repairs to the steel columns, and replacement of the original wood stringers and pavers with a steel grid deck, first installed in 1948.

Maintenance repairs and modifications to the original approach spans are also limited and are not considered intrusive. Limited inkind repairs

AA-764

Maryland Historical Trust/
National Register of Historic Places
Continuation Sheet

name of

MHT Inventory No.

name of property: Severn River Bridge

Section number __7 Page _4

have been made to the concrete balustrade, and a few sections have been replaced. The entire concrete roadbed was replaced inkind ca. 1980, and the expansion joints and wearing surface have been periodically replaced as part of bridge maintenance activities. In 1983 fiberglass jackets of similar color to the original material were installed around nine of the pier bases. In addition to providing protection from wave action, the primarily submerged, removable jackets doubled as the forms for concrete poured to correct surface deterioration.

These modifications are relatively minor when viewed in the context of the structure as a whole. They are not intrusive in appearance or function nor are they of enough significance to compromise the overall integrity of the bridge. Neither is the replacement in 1978 of the four easternmost spans and elimination of details of the north abutment. While not similar in design, the alteration is limited to one end of the 1850'-long structure, leaving over 85% of the original fabric unchanged.

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8. Statement of Significance			FRIT THACHERT NO	AA-704
the s	ignificance of t	his property i	n relation to other properties: tewide local	AA-764
Applicable National Register Criteria	XA DB	⊠c □	D	
Criteria Considerations (Exceptions)	□A □B	_c _	D DE DF DG	•
Areas of Significance (enter categories Transportation Engineering	s from instructi	ons)	Period of Significance 1922-1924	Significant Dates 6/1924
			Cultural Affiliation N/A	
Significant Person		S 5	Architect/Builder Strauss, Joseph B.	
n/a			Greiner, John Edwin	

State significance of property, and justify criteria, criteria considerations, and areas and periods of significance noted above.

SIGNIFICANCE SUMMARY:

The largest and best-preserved example of a patented Strauss trunnion bascule bridge in the state of Maryland, the 1922-1924 Severn River Bridge at Annapolis survives in a remarkably complete state of preservation, appearing and operating much as it did in June of 1924 when it was finished. It represents the successful solution of complicated engineering problems, resolved in an aesthetically pleasing manner. The bridge type used for both the main and approach spans was selected for visual as well as engineering considerations. The bridge is associated with Joseph B. Strauss and John Edwin Greiner, nationally significant engineers of the early 20th century. It is notable as being the only opening bridge in Maryland to be associated with steel arched spans, which enabled longer, more graceful spans than found on other bridges. It is one of a group of concrete drawbridges constructed in Maryland in the 1920s and 1930s in response to the shift to greater volumes of motor vehicle traffic and a need to accommodate both vehicular and waterborne traffic. The well-proportioned bridge is a regionally significant example of the City Beautiful movement. designed to blend with and to compliment the Naval Academy reservation, which the west bridge approach bisects. That historic context survives today, as does the setting of the bridge. Because of its engineering significance, association with noted engineers, architectonic qualities, state of preservation, and historical association with the United States Naval Academy National Historic Landmark district, the Severn River Bridge appears to meet the criteria for inclusion in the National Register of Historic Places (criterion A and criterion C). It also setting, materials, possesses "integrity of location, design, workmanship, feeling, and association."

See continuation sheet

Maryland Historical Trust/ National Register of Historic Places Continuation Sheet

MHT Inventory No.

Section number 8 Page 2

name of property: Severn River Bridge resource name

county Maryland Anne Arundel County

HISTORIC CONTEXT:

MARYLAND COMPREHENSIVE HISTORIC PRESERVATION PLAN DATA

Geographic Organization: WESTERN SHORE

Chronological/Developmental Period(s): INDUSTRIAL/URBAN DOMINANCE

A.D. 1870-1930

Prehistoric/Historic Period Theme(s):

TRANSPORTATION ENGINEERING

Resource Type:

Category: STRUCTURE: Bridge

Historic Environment: URBAN

Historic Function(s) and Use(s): TRANSPORTATION/ROAD RELATED/BRIDGE

Known Design Source: BRIDGE ENGINEER: JOSEPH B. STRAUSS

CIVIL ENGINEER: JOHN EDWIN GREINER

Maryland Historical Trust/ National Register of Historic Places Continuation Sheet name of

MHT Inventory No.

name of property: Severn River Bridge

Section number 8 Page 3

HISTORIC CONTEXT

HISTORIC SETTING

This resource was constructed and achieved its significance in 1922-24, which was a period of growing industrial and urban dominance in Maryland. The Severn River Bridge is situated in Anne Arundel County, adjacent to the city of Annapolis. The county was still predominantly rural and agricultural at the time, with a growing reliance on truck farming. Annapolis' economy centered around the state government and the United States Naval Academy, along with some maritime activities.

The Naval Academy had undergone rapid expansion at the turn of the century, as a result of the growing emphasis placed on seapower by the United States after the Spanish American War. This expansion led the Academy to rebuild its entire campus, replacing virtually all of its mid-nineteenth century buildings with new Beaux Arts structures designed by the renowned architect Ernest Flagg between 1899-1906. Flagg deliberately integrated the Severn River into his design, incorporating several vistas of the river into the overall plan of the Academy.

Annapolis' colonial role as a major seaport and center of trade had been eclipsed by Baltimore in the nineteenth century. Baltimore, which experienced tremendous growth from the beginning of the nineteenth century through the middle of the twentieth, had become the main urban center to which Annapolis and Anne Arundel County related. This is consistent with the general trends of growing urban dominance in the period. Until the first quarter of the twentieth century, however, there was no effective system of transportation linking Annapolis to the northern part of the county or to Baltimore. During this period one of the main themes in local history is the development of a modern transportation system linking Annapolis to Baltimore and the areas in between.

The Baltimore and Annapolis Short Line Railroad first opened in 1887, crossing the Severn on a wooden trestle above the site of the Rte. 450 bridge. From the period 1900 to 1930, automobile registrations in the United States greww from 8,000 to 22,972,745. (Bradford, p. 38). This explosion fueled a demand for hard-surface all-weather roads. This period saw the first state and federal subsidies for highway construction. In 1910 a state Public Highways Act called for the construction of a boulevard between Annapolis and Baltimore. (Bradford, p. 39.) This road, the Old Annapolis Boulevard, (now Rte. 648) was completed in 1912, crossing the Severn on a wooden bridge which preceded the existing one. This was the first modern, direct link between

Maryland Historical Trust/
National Register of Historic Places
Continuation Sheet

name of

MHT Inventory No.

name of property: Severn River Bridge

Section number ____8 Page __4

Annapolis and Baltimore, connecting the state capital and the rural areas to the north with the industrial and commercial heart of the state. In the 1920s dual-lane highways began to connect major destinations, replacing the earlier roads which were often laid out on narrow winding paths dating from colonial times. Ritchie Highway, the dual-lane replacement for the Old Annapolis Boulevard, was completed in 1939. Ritchie Highway technically terminates at the Ritchie Memorial Scenic Overlook, just above the bridge, and the Severn River Bridge links the highway to the Annapolis side of the river. Ritchie Highway, incidently, was originally hailed as one of the most scenic highways in America, the first state of Maryland road built with a mandate to preserve "natural scenic beauty," a scenic route with a stunning view of the Severn River and the Neo-Classical Rte. 450 bridge as its southern terminus. (Bradford, p. 39)

The present Route 450 bridge stands at the center of this critical period of highway construction. It was built in response to the traffic generated by the 1912 Old Annapolis Boulevard, yet has served to carry the greater traffic of lower Ritchie Highway over the Severn for fifty years. Its construction was an outgrowth of the increasing priority placed on efficient and safe highways connecting urban centers to outlying towns and agricultural areas. It is one of only four bridges of this period and general type of construction remaining in Maryland.

E RESOURCE HISTORY

The Route 450 Severn River Bridge was constructed from 1922 to 1924 for the State Roads Commission of Maryland. It replaced an earlier wooden span in the same location. It was built to connect the Old Annapolis Boulevard with the Annapolis shore of the Severn. The necessity of a new bridge became apparent when the Old Annapolis Boulevard was completed in 1912; discussion of how best to improve the river crossing commenced then and culminated in the dedication of the present span in Joseph B. Strauss (1870-1938) was the engineer for the moveable span, while John Edwin Greiner (1859-1942), was the civil engineer consulting to the State Roads Commission designers, headed by the articulated Strauss patented Commissioner John Mackall. counterweight bascule in 1905 (patent granted in 1911), and he went on to become one of the most distinguished moveable span bridge engineers Greiner was considered the dean of Maryland civil in the country. engineers and a bridge engineer of national recognition. explained that, while he had "supervised and had closely followed the drawing of the bridge plans, he felt it would be advisable to have an outside engineer to pass on them in order that the state might be assured of the best work" (Capital 10/14/1921). Greiner's fee on the Severn River Bridge was one percent of the cost of the bridge.

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MHT Inventory No.

Maryland Historical Trust/ National Register of Historic Places Continuation Sheet name of

name of property: Severn River Bridge

Section number 8 Page 5

The Superintendent of the United States Naval Academy, Admiral Henry B. Wilson, USN, also was involved in the initial design phases, to ensure that the structure would be compatible with the Academy campus, which had been recently redesigned and rebuilt by well-known architect Ernest Flagg. In November 1921, Admiral Wilson told the State Roads Commission that the bridge best be "pleasing in appearance," complete with an open balustrade and that the approaches should be marked in "a pleasing way," or the Navy would withhold permission for the south approach to occupy government property. (USNA Archives, Letter, Wilson to Mackall. 11/23/1921.)

With the exception of some details of the east abutments, the four easternmost approach spans, the windows in the westerly operators house, and a gunited finish added to the operators house in 1933 (replacing the original stucco that lasted on the hollow-tile building for only about ten years), the bridge survives as built. A.G. Lichtenstein & Associates, a consulting engineering firm with a specialty in the evaluation and restoration of historic bridges, inspected the bridge in October and November 1991. The bridge still operates as built in 1922-= 24, and enjoys integrity of location, design, setting, materials, With the exception of the 1978 workmanship, and association. replacement of the four easternmost approach spans with simple steel beam spans supported on concrete pier bents, most work done to the original fabric has been inkind or nearly inkind repair and/or replacement that is neither intrusive in appearance nor compromises the integrity of the original design, and is more accurately identified as maintenance repairs rather than alterations (Lichtenstein inspection).

A physical inspection of the bascule spans and operating mechanism by mechanical engineer George Perkons, P.E. of Lichtenstein & Associates in November, 1991 led him to conclude that the "operating system has not been changed" and that "all machinery parts are original or inkind replacements, but they show considerable wear." (Perkons, 11/19/91). Each leaf with articulated counterweights under the approach spans is operated by machinery located on the concrete bascule piers. western counterweight and steel frame are 1966 inkind replacements of the original. The operating machinery of each leaf consists of an electric motor and brake which drive two rack pinions through the six sets of open reduction gears, transverse shafts, and couplings and bearings mounted on the structural steel supports (columns) attached to the bascule piers. Deteriorated portions of the bottoms of the rivetconnected trunnion towers and machinery support beams were repaired with both inkind and welded replacements in 1978, 1986, and 1989, according to the State Highway Administration (SHA). Each rack pinion engages a segmental rack which is attached to the bottom flange of the bascule

Maryland Historical Trust/ National Register of Historic Places Continuation Sheet name of

MHT Inventory No.

name of property: Severn River Bridge

Section number 8 Page 6

deck girder. Each leaf drive is equipped with a machinery brake operated electrically by a solenoid. The drive shaft for the manual opening of the bridge has been removed, but the original jaw-type locks and operating machinery remain and are still functioning. (Perkons, 11/19/91).

Controls for operating the bridge are, and always were, located in the operators house adjacent to the west leaf. The manual trolley-like bridge operation controls (one per leaf) appear to be original. A push-button relay panel that controls the sequential operation was added in 1975. It is likely that the bridge has always had limit switches to protect against opening a leaf beyond its intended limits. (Perkons, 11/19/91).

There have been minor alterations/modifications to the structure, including bypassing the original manual opening mechanism, limited welded repairs to the steel columns, and replacement of the original wood stringers and pavers with a steel grid deck, first installed in 1948. The pylons on the western shore are original, although they have lost their original lanterns.

Maintenance repairs and modifications to the original approach spans are also limited and are not intrusive. Limited inkind repairs have been made to the concrete balustrade, and a few sections have been replaced. The entire concrete roadbed was replaced inkind ca. 1980, and the expansion joints and wearing surface have been periodically replaced as part of bridge maintenance activities. In 1983 fiberglass jackets of similar color to the original material were installed around nine of the pier bases. In addition to providing protection from wave action, the primarily submerged, removable jackets doubled as the forms for concrete poured to correct surface deterioration.

These modifications are relatively minor when viewed in the context of the structure as a whole. They are not intrusive in appearance or function nor are they of enough significance to compromise the overall integrity of the bridge. Neither is the replacement in 1978 of the four easternmost spans and elimination of details of the north abutment. While not similar in design, the alteration is limited to one end of the 1850'-long structure, leaving over 85% of the original fabric unchanged.

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Maryland Historical Trust/ National Register of Historic Places

MHT Inventory No.

Continuation Sheet name of property: Severn River Bridge

Section number __8 ___ Page ___7__

RESOURCE ANALYSIS

The double-leaf trunnion moveable main span with articulated underneath counterweights is a well-preserved example of significant early-20th century transportation engineering and technology. Design Engineer Joseph B. Strauss (1870-1938) patented the articulated counterweight bascule in 1905 (patent granted in 1911), and he went on to become one of the most distinguished moveable span bridge engineers in the country. John Edwin Greiner (1859-1942), dean of Maryland civil engineers and likewise a bridge engineer of national recognition, served as consulting engineer on the project. The concrete-encased steel truss arched approach spans are also of notable engineering significance because they are well-preserved examples of an unusual bridge type that was selected, in part, to facilitate construction of the long graceful arches. the original twenty-four cantilevered approach spans at the easternmost end of the bridge were replaced, but otherwise the structure has been maintained rather than altered, making it a well-preserved and significant example of architectural, historical, and engineering achievement.

Engineering Significance

The Severn River Bridge ranks as one of the most significant and monumental moveable bridges built in Maryland before the Second World War. The State of Maryland recognized the 1850'-long, 24-span bridge, with its Strauss double-leaf trunnion main span and unusual concrete-encased steel deck truss approach spans, as an engineering achievement. In its Annual Reports of the State Roads Commission for the Years 1924, 1925, and 1926, the State Roads Commission stated that "the completion of the Severn River Bridge near Annapolis in June, 1924, is perhaps the most marked event in the replacement program of dangerous and one-way bridges by the Commission, and in itself stands out as one of the most important and pleasing of the larger modern highway structures built in this county." (p. 59). It was second only to the Hanover Street Bridge, a double-leaf Rall bascule lift bridge built between 1914-1917, "among all the bridges of the State in its size, ornateness and modern development." (Maryland Gazette, 6/19/24).

The selection of encased steel trusses, an uncommon bridge type, for the approach spans resulted from both engineering and aesthetic considerations, and resulted in a "type of design that was exceedingly unique" (Annual Reports of the State Roads Commission of the Years 1920, 1921, 1922, and 1923, p. 52). As the main easterly approach to the venerable state capital and the United States Naval Academy, the bridge had to be of monumental design in deference to its important setting. The site, however, was not conducive to supporting the timber-framed falsework required to construct the desired arched approach spans. So

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MHT Inventory No.

Maryland Historical Trust/ National Register of Historic Places Continuation Sheet name of

name of property: Severn River Bridge

Section number 8 Page 8

steel trusses, which could carry the weight of the forms and concrete to create the illusion of monumental approaches, were selected. Their cantilevered configuration also contributes to the engineering significance of the structure. The approach spans are in the tradition of the concrete-encased structural arch bridge pioneered by Viennese engineer Josef Melan and patented by him in this country in 1894 (Condit, p. 249).

Association with noted bridge engineer Joseph B. Strauss The Severn River Bridge is a nearly complete example of a patented bridge design that represents a milestone in the development of moveable spans. Its double-leaf trunnion with an articulated underneath counterweight main span was designed by Joseph B. Strauss (1870-1938), the most widely recognized early-20th century moveable bridge engineer in the country. He was later the chief engineer of the Golden Gate Bridge (constructed between 1933 and 1937). The pivoting counterweight linkage, like that used for the Severn River Bridge, was invented by and patented by J.B. Strauss (patent No. 995,813, filed in 1905, granted 1911,). The first span of this general type with the more common overhead counterweight arrangement, was built in Cleveland in 1905, the same year Strauss established the Strauss Bascule Bridge Company (Chicago) to market his new bascule bridge designs. His parallelogramlinked counterweight bascule bridges, like the Severn River Bridge, were his best-known design ("J.B. Strauss Dies at Los Angeles," Engineering News-Record 120 (May 19, 1938), p. 702).

Strauss reasoned that if, unlike the traditional trunnion bridge, which operated like a seesaw and moved in a vertical plane on a horizontal steel pivot, the entire weight of the counterweight could be concentrated at the end (tail) of the moveable leaf, it would then be possible to use a lighter counterweight. Such an arrangement also meant a shorter tail end to the leaf, thus saving on materials such that the "counterweight could be made in such shape that no pit is required to receive it when the leave is in the upright position." (Waddell, p. 704). The patented linkage, or arms, ensures that the counterweight will always move in a series of parallel positions and thus maintain the position of the weight at the tail end of the leaf.

Association with noted civil engineer John Edwin Greiner
In addition to its association with noted engineer Joseph B. Strauss, designer of the moveable span, the bridge is associated with John Edwin Greiner (1859-1942), dean of Maryland civil engineers. He was hired by the State of Maryland as "special consulting engineer" on the Severn River Bridge project (Evening Capital, 10/14/1921). Greiner was one of the early as well as one of the most successful bridge engineers of his day. The consulting bridge engineering firm he founded in Baltimore in

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AA-764 MHT Inventory No.

Maryland Historical Trust/ National Register of Historic Places Continuation Sheet name of

name of property: Sever

Severn River Bridge

Section number 8 Page 9

1908 is still active. Born and educated in Delaware, he started his distinguished career with Edgemoor Bridge Works (Wilmington, DE) in 1880, and moved to the Baltimore and Ohio Railroad Company in 1885, where he rose to the position of Engineer of Bridges and Buildings in 1899 and Assistant Chief Engineer in 1905. While with the railroad, Mr. Greiner had "full responsibility for the design and construction of all important bridges built by the Baltimore and Ohio, among the most noted of which are that crossing of the Susquehanna River at Havre de Grace, that crossing the Ohio River at Parkersburg and Bentwood, and that crossing the Potomac River at Harpers Ferry. (The Cyclopaedia of American Biography, p. 325). After establishing his own practice in 1908, he was retained by a wide variety of clients including the B&O Railroad and the cities of Baltimore, MD; Bridgeport, CT; and Wilmington, DE. He was also hired by the Commonwealth of Pennsylvania and the Maryland State Roads Commission. Greiner designed "a number of very handsome monumental concrete bridges," among which may be mentioned the beautiful Hanover Street bridge crossing the Middle Branch of the Patapsco River at Baltimore, MD, and the Stratford Avenue Bridge at Bridgeport, CT. (<u>Ibid</u>, p. 325). The Connecticut Department of Transportation has evaluated the Stratford Avenue bridge, a rolling lift bascule, to be eligible for listing in the National Register of Historic Places.

J.E. Greiner's involvement with the Severn River Bridge project illustrates the role and importance of the consulting engineer as it came to be defined in the early decades of this century. He was hired by the state to ensure "perfection" for the plans and specifications for the bridge which was designed by the staff engineers of the State Roads Commission under the direction of Commissioner John Mackall (Evening Capital 10/14/1921). Mackall explained that, while he had "supervised and had closely followed the drawing of the bridge plans, he felt it would be advisable to have an outside engineer to pass on them in order that the state might be assured of the best work" (Ibid.) Greiner's fee on the Severn River Bridge was one percent of the cost of the bridge.

Architectural Significance

The handsome well-proportioned bridge with its succession of graceful arched approach spans and its modified Beaux Arts-roofed operators houses is a significant example of Neo-Classical-inspired detailing applied to a utilitarian structure. The aesthetics of the bridge were an important design consideration because it serves as the easterly "gateway" to the state capital and the Naval Academy reservation. With the exception of some details of the east abutments, the four easternmost approach spans, the windows in the westerly operators house, and a gunited finish added to the operators house in 1933 (replacing the original stucco that lasted on the hollow-tile building for only about

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Maryland Historical Trust/ National Register of Historic Places Continuation Sheet name of property:

MHT Inventory No.

Severn River Bridge

Section number 8 Page 10

ten years), the bridge survives as built and is a regionally important example of the City Beautiful philosophy. The City Beautiful movement stressed the benefit and important of aesthetics in urban planning and The bridge's construction was an outgrowth of the increasing priority placed on efficient and safe highways connecting urban centers to outlying towns and agricultural areas. These highways were built to handle the vastly increasing amount of traffic, particularly trucks, which occured in the first third of the century. The Severn River Bridge is one of only four bridges of this period and general type of construction remaining in Maryland, the others being two that cross the Bohemia and Sassafrass rivers, one across the Choptank at Cambridge, and one across the Chester at Chestertown. (MHT State Historic Sites Survey Form/NR Nomination Form for Site K-540, Chester River Bridge at Route 213, "Significance Summary" section, 1983). is the only opening bridge to be associated with steel arched spans in the state. (MHT State Historic Sites Survey, AA-764, "Statement of Significance, 1980)

Frequent correspondence between Admiral Henry B. Wilson, Superintendent of the Naval Academy, and John Mackall, Chief Engineer, Maryland State Roads Commission, designer of the bridge, illustrate just how important the appearance of the bridge was. As early as 1912, the Superintendent of the Naval Academy expressed concern about a new bridge across the Severn River at Annapolis (USNA Records of the Superintendent, General Correspondence/Support Facilities. Series: Civil Facilities and Relations. Box 1, Folder 1 "Bridges/Severn River." Letter. Gov. Goldsborough to Com. Cole 2/20/1912. Hereafter referred to as USNA Archives.) In October 1921, when the bridge was about to become a reality, Superintendent Admiral Wilson wrote Governor Albert C. Ritchie expressing his concern about the appearance of the new span:

The general description from newspaper accounts shows that the structure will be of a permanent character. The Naval Academy is naturally very much interested in this construction ..., not only for ease of access to visitors but also the structure is on one of the main fronts of the Naval Academy and, to a certain extent, will be more or less associated with the general impression gained of this institution. For that reason I am particularly interested in hoping that the structure will not only be of a substantial character, but pleasing in appearance, and that it will fit in with the general architectural scheme of the approach to the Naval Academy and the Capital of the State of Maryland. (USNA Archives. Letter. ADM Wilson to Gov. Ritchie. 10/1/21.)

In November 1921, Admiral Wilson told the State Roads Commission that the bridge best be "pleasing in appearance," complete with an open

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Maryland Historical Trust/
National Register of Historic Places
Continuation Sheet

name of

MHT Inventory No.

name of property: Severn River Bridge

Section number 8 Page 11

balustrade and that the approaches should be marked in "a pleasing way," or the Navy would withhold permission for the south approach to occupy government property. (USNA Archives. Letter, Wilson to Mackall, 11/23/1921.)

The Naval Academy's involvement with the design of the monumental bridge illustrates the importance of aesthetics in the overall design of the structure and the impact of the City Beautiful movement on large civic projects in the early-to-mid twentieth century.

Association with National Historic Landmark District

The <u>entire</u> United States Naval Academy reservation was designated a National Historic Landmark (NHL) District in 1961. (Letter, Sec. of the Interior Morris Udall to Secretary of the Navy John B. Connally, USNA Archives, 7/21/61) The reservation is located on both sides of MD 450, the approach road to the Severn River Bridge.

The history and appearance of the Severn River Bridge is associated with that of the United States Naval Academy because of its location contiguous to the Academy reservation, and the historical association of Academy personnel with the design of the span. The Academy provides part of the historic context of the bridge, and the bridge provides part of the context of the Academy. This bridge would not look like it does without the involvement of the superintending staff of the Naval Academy. The right-of-way on the west side of the bridge was, prior to 1922 when the bridge was started, part of the Naval Academy reservation. The government, acting through the Superintendent of the Naval Academy, provided the land for the western right-of-way, and the granting of that land was made only after the Superintendent was certain that their aesthetic and engineering concerns were addressed. (USNA Archives. Box 1, Folder 1, "Bridges/Severn River"). That strong physical, visual, and historical association between the bridge and the Academy has not changed.

The Naval Academy Superintendent had been involved with the State of Maryland and other groups concerned with planning the Severn River crossing since at least 1912. Primary source documentation clearly illustrates that while the bridge is a "civil" (in the sense of civilian) facility, it was treated as a design element of the Academy by the Academy Superintendent and his staff, who played an active and influential role in the design of the 1922-24 bridge. In fact the construction contract for the bridge was to include a section for returning the south approach of the older bridge this span replaced to the condition of the rest of the campus. (Ibid.) Thus, the construction of the 1922-24 Severn River Bridge affected the appearance of the Academy reservation. That part of the contract work, including dredging

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Maryland Historical Trust/ National Register of Historic Places Continuation Sheet name of

AA-764 MHT Inventory No.

name of property:

Severn River Bridge

Section number 8 Page 12

removing a road, and landscaping the Academy reservation waterfront adjacent to the southwest corner of the bridge, is part of the NHL district.

Integrity of design

The engineering significance of the structure is enhanced by the fact that it survives in a remarkably complete state of preservation. A.G. Lichtenstein & Associates, a consulting engineering firm With a specialty in the evaluation and restoration of historic bridges, inspected the bridge in October and November 1991. The bridge still operates as built in 1922-24, and enjoys integrity of location, design, setting, materials, workmanship, and association. With the exception of the 1978 replacement of the four easternmost approach spans with simple steel beam spans supported on concrete pier bents, most work done to the original fabric has been inkind or nearly inkind repair and/or replacement that is neither intrusive in appearance nor compromises the integrity of the original design and is more accurately identified as maintenance repairs rather than alterations (Lichtenstein inspection).

A physical inspection of the bascule spans and operating mechanism by mechanical engineer George Perkons P.E. of Lichtenstein & Associates in " November, 1991 led him to conclude that the "operating system has not been changed" and that "all machinery parts are original or inkind replacements, but they show considerable wear." (Perkons, 11/19/91). Each leaf with articulated counterweights under the approach spans is operated by machinery located on the concrete bascule piers. western counterweight and steel frame are 1966 inkind replacements of The operating machinery of each leaf consists of an the original. electric motor and brake which drive two rack pinions through the six sets of open reduction gears, transverse shafts, and couplings and bearings mounted on the structural steel supports (columns) attached to the bascule piers. Deteriorated portions of the bottoms of the rivetconnected trunnion towers and machinery support beams were repaired with both inkind and welded replacements in 1978, 1986, and 1989, according to the State Highway Administration (SHA). Each rack pinion engages a segmental rack which is attached to the bottom flange of the bascule Each leaf drive is equipped with a machinery brake deck girder. operated electrically by a solenoid. The drive shaft for the manual opening of the bridge has been removed, but the original jaw-type locks and operating machinery remain and are still functioning. (Perkons, 11/19/91).

Controls for operating the bridge are, and always were, located in the operators house adjacent to the west leaf. The manual trolley-like bridge operation controls (one per leaf) appear to be original. A pushbutton relay panel that controls the sequential operation was added in

MHT Inventory No.

Maryland Historical Trust/ National Register of Historic Places Continuation Sheet name of

name of property: Severn River Bridge

Section number 8 Page 13

1975. It is likely that the bridge has always had limit switches to protect against opening a leaf beyond its intended limits. (Perkons, 11/19/91).

There have been minor alterations/modifications to the structure, including bypassing the original manual opening mechanism, limited welded repairs to the steel columns, and replacement of the original wood stringers and pavers with a steel grid deck, first installed in 1948.

Maintenance repairs and modifications to the original approach spans are also limited and are not intrusive. Limited inkind repairs have been made to the concrete balustrade, and a few of the sections have been replaced. The entire concrete roadbed was replaced inkind ca. 1980, and the expansion joints and wearing surface have been periodically replaced as part of bridge maintenance activities. In 1983 fiberglass jackets of similar color to the original material were installed around nine of the pier bases. In addition to providing protection from wave action, the primarily submerged, removable jackets doubled as the forms for concrete poured to correct surface deterioration.

These modifications are relatively minor when viewed in the context of the structure as a whole. They are not intrusive in appearance or function nor are they of enough significance to compromise the overall integrity of the bridge. Neither is the replacement in 1978 of the four easternmost spans and elimination of details of the north abutment. While not similar in design, the alteration is limited to one end of the 1850'-long structure, leaving over 85% of the original fabric unchanged.

Conclusion

In conclusion, the historical, engineering, and architectural significance of the Severn River Bridge at Annapolis is matched by its integrity of design and setting. Heralded as a significant engineering achievement when it was completed, it still appears and operates much as it did in 1924. The one significant alteration to the over one-third-of-a-mile-long structure is limited to the replacement of the four easternmost approach spans which are not of the same design as the originals. The bridge possesses the historical, architectural, and engineering significance as well as the structural integrity to meet the criteria for inclusion in the National Register of Historic Places.

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See Continuation Sheet.

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	X See continuation sheet
Previous documentation on file (NPS): preliminary determination of individual listing (36 CFR 67) has been requested previously listed in the National Register previously determined eligible by the National Register designated a National Historic Landmark	Primary location of additional data: State historic preservation office Other State agency Federal agency Local government
recorded by Historic American Buildings Survey #	University Other Specify repository:
recorded by Historic American Engineering Record #	United States Naval Academy
10. Geographical Data	
Acreage of property 1.43 acres	
USGS quad Annapolis, MD	-
ITM References A	B
	See continuation sheet
Verbal Boundary Description The drawbridge which spans the Severn River at way. Beginning on the United States Naval Aca at MD Rte 450 Roadway Station 115+75 and exter Station 134+25, for a total distance of 1850 f	nding from that point northeast to Roadway
	See continuation sheet
Boundary Justification The United States Naval Academy reservation as clearly define the bridge's location. The Maxwerifiable standard for determining the bridge	nd the Severn River are unique landmarks which ryland State Highway stationing system is a e's length and location.
Sarah Filkins	See continuation sheet
11. Form Prepared By	5 Programtion
name/title Gillian R. Barr Assistant to t	he Director of Preservation date 4/14/92
organization <u>Historic Annapolis Foundation</u> street & number 194 Prince George Street	10100hone 410-267-7619
city or town Annapolis	state Maryland zip code 21401
for: Citizens for a Scenic Severn River Brid	age, Inc., Bryon Miller
307 Fourth St., Annapolis, MD 21403	

Maryland Historical Trust/ National Register of Historic Places **Continuation Sheet** name of property: Severn River Bridge

MHT Inventory No.

Section number 9 Page 1

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INVENTORY FORM FOR STATE HISTORIC SITES SURVEY

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AND/OR COMMON				
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Maryland			COUNTY Anne Arundel	
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	BEING CONSIDERED	XYES: UNRESTRICTED	INDUSTRIAL	XTRANSPORTATION
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DATE_

CONDITION

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CHECK ONE

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X_GOOD __FAIR

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-

DESCRIBE THE PRESENT AND ORIGINAL (IF KNOWN) PHYSICAL APPEARANCE

This bridge carries Maryland Route 450 across the Severn River in a NE-SW direction. It consisted originally of 24 steel arches of 70' spans with a 95' span of double leaf bascule. Several of the steel arches were replaced at the northeast end by concrete structures after that portion of the bridge collapsed in 1978. The bridge house is a concrete square plan structure at the westernmost corner of the bascule span.

PERIOD	AREAS OF SIGNIFICANCE CHECK AND JUSTIFY BELOW					
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1800-1899 ≾ 1900-	COMMERCECOMMUNICATIONS	EXPLORATION/SETTLEMENTINDUSTRYINVENTION	PHILOSOPHY POLITICS/GOVERNMENT の名意なも、15日 連	A.		
SPECIFIC DAT	ES 1924 (1978)	BUILDER/ARCH				

STATEMENT OF SIGNIFICANCE

Aside from the significance which attaches to this bridge for its moveable span, it is notable for being the only opening bridge to be associated with steel arched spans. These made possible longer spans than are to be found on other comparable brodges, and add greatly to the graceful impression of the structure, especially when viewed from the water. See also M/DOT Survey general bridge significance.

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9 MAJOR BIBLIOGRAPHICAL REFERENCES

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CONTINUE ON SEPARATE SHEET IF NECESSARY

10 GEOGRAPHICAL DATA ACREAGE OF NOMINATED PROPERTY ___ to the entry that he was and Quadrangle Name: Annapolis Quadrangle Scale: 1:24 000 UTM References: A: 18. 371300. 4317000 B: 18. 370880. 4316710 VERBAL BOUNDARY DESCRIPTION NA LIST ALL STATES AND COUNTIES FOR PROPERTIES OVERLAPPING STATE OR COUNTY BOUNDARIES STATE COUNTY NA STATE COUNTY II FORM PREPARED BY NAME / TITLE John Hnedak/M/DOT Survey Manager ORGANIZATION Maryland Historical Trust STREET & NUMBER 1980 TELEPHONE (301) 269-243821 State Circle CITY OR TOWN Maryland 21401 Annanolis

The Maryland Historic Sites Inventory was officially created by an Act of the Maryland Legislature, to be found in the Annotated Code of Maryland, Article 41, Section 181 KA, 1974 Supplement.

The Survey and Inventory are being prepared for information and record purposes only and do not constitute any infringement of individual property rights.

RETURN TO: Maryland Historical Trust

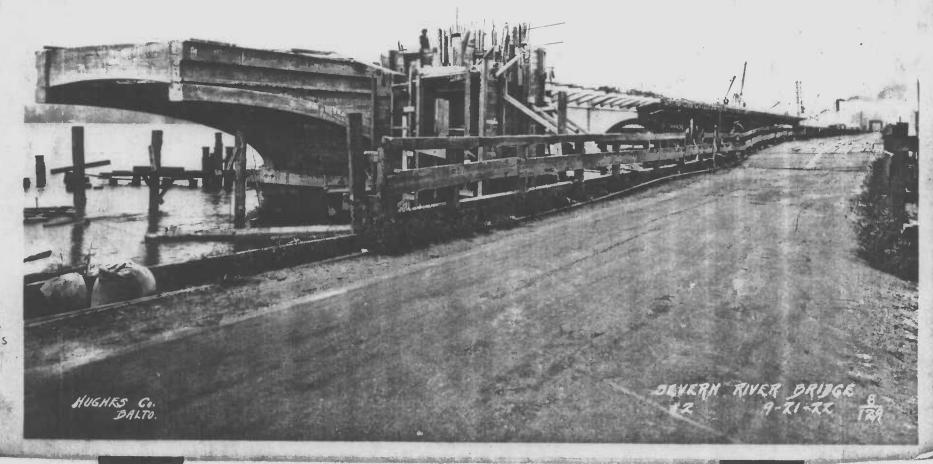
The Shaw House, 21 State Circle

Annapolis, Maryland 21401

(301) 267-1438

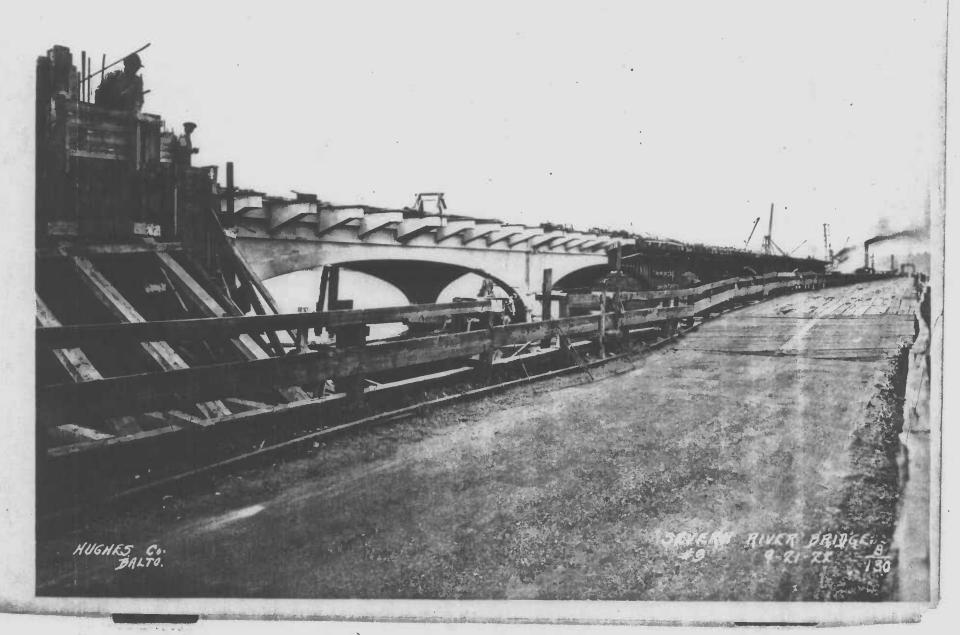
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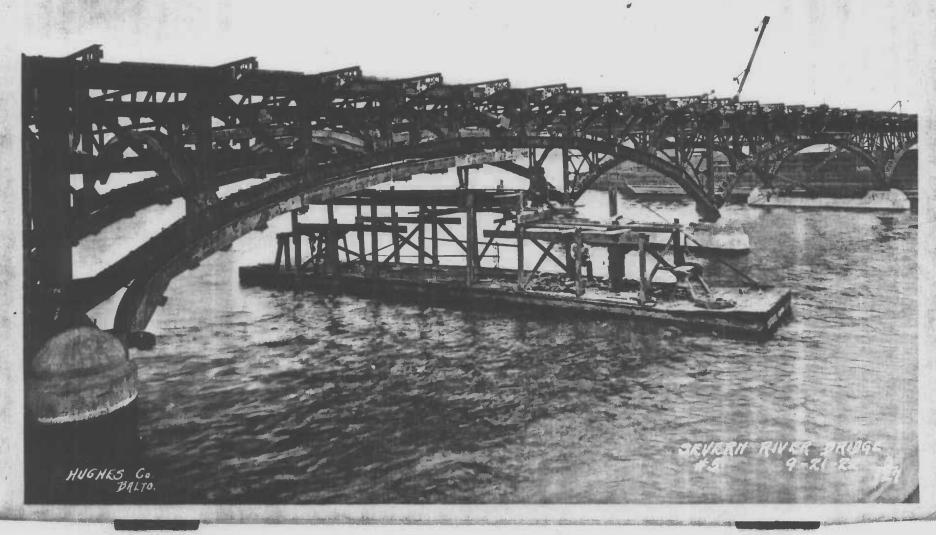
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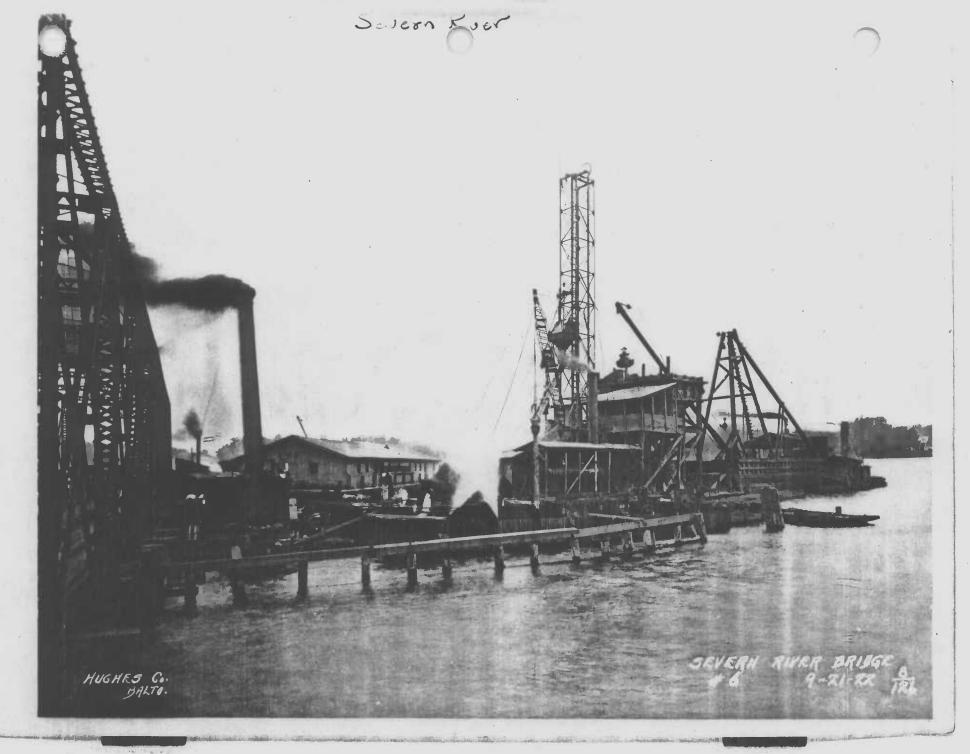
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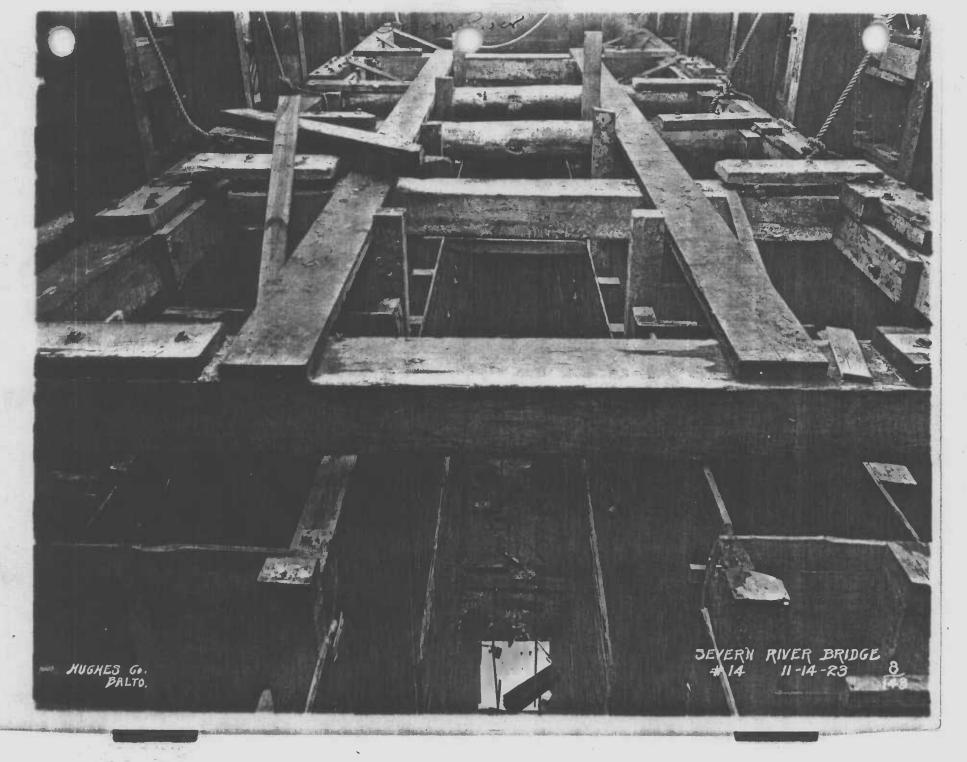
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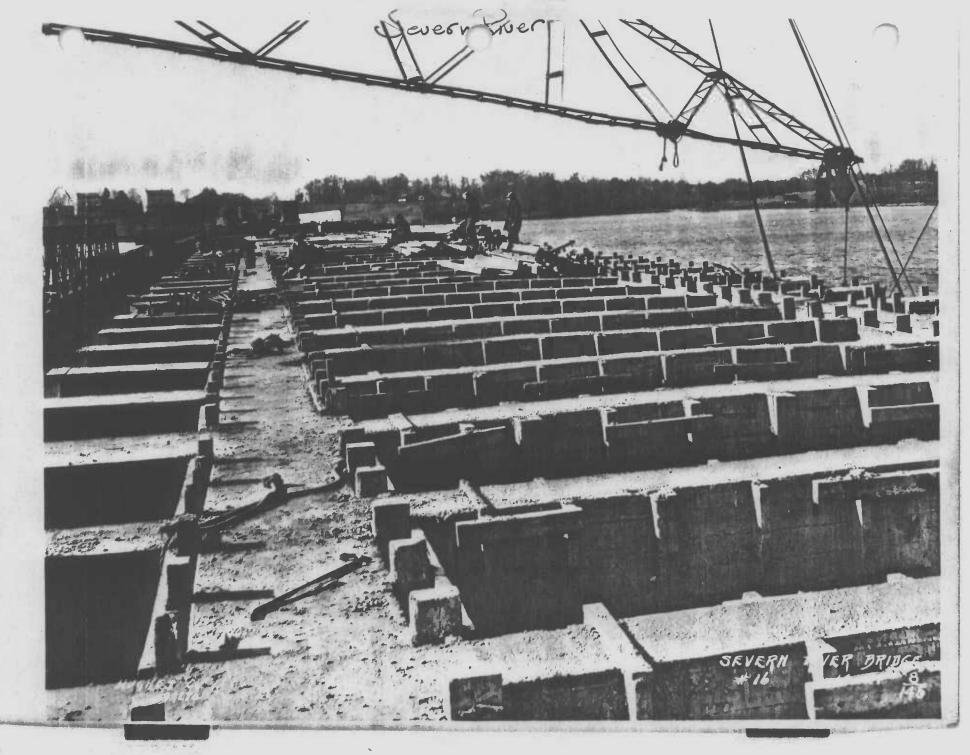




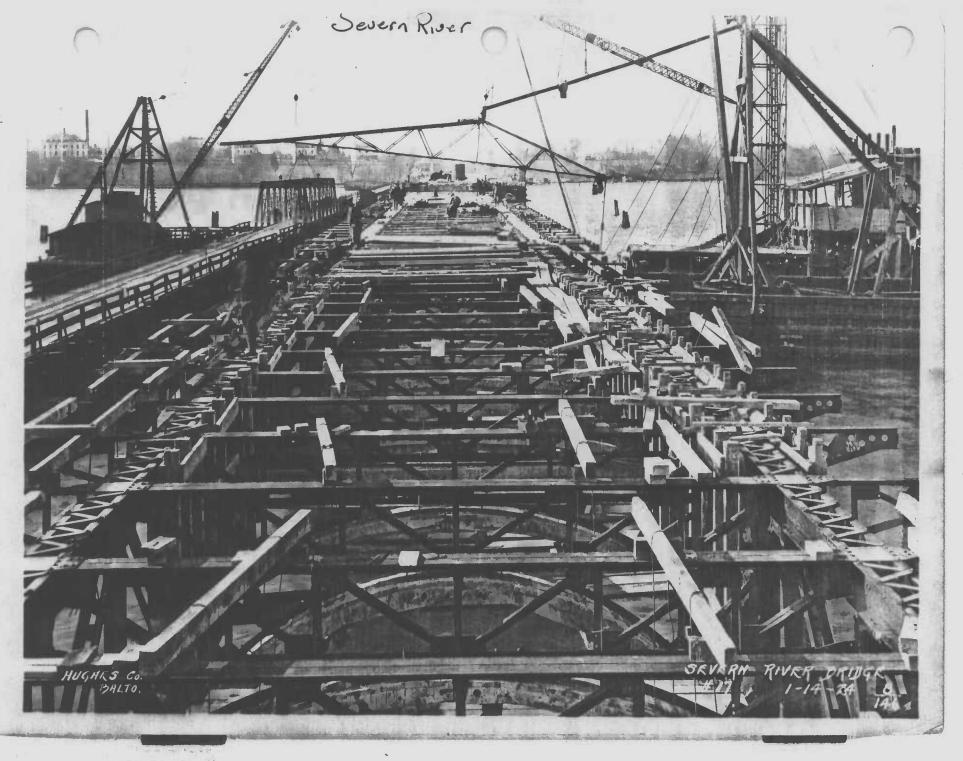
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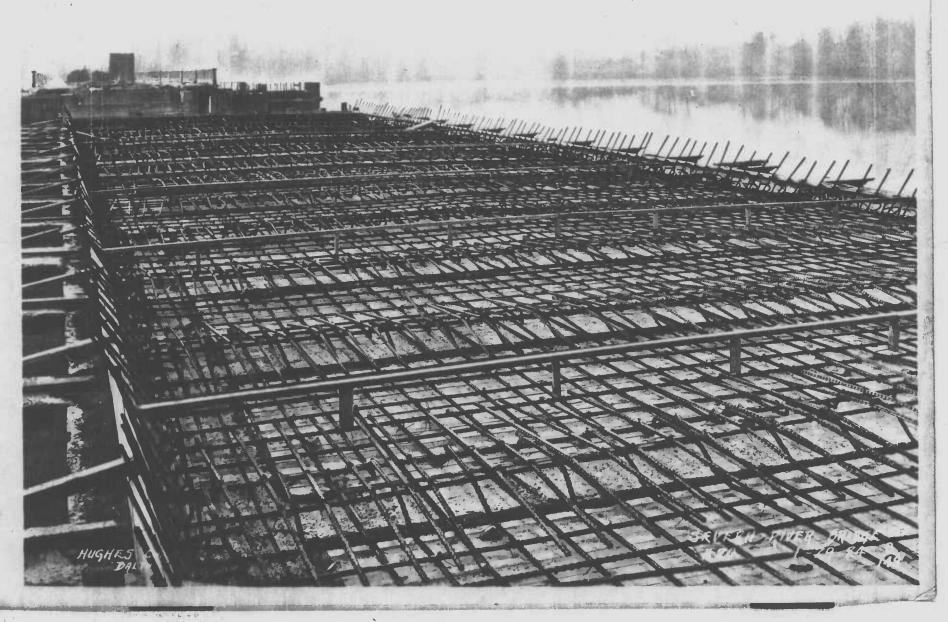


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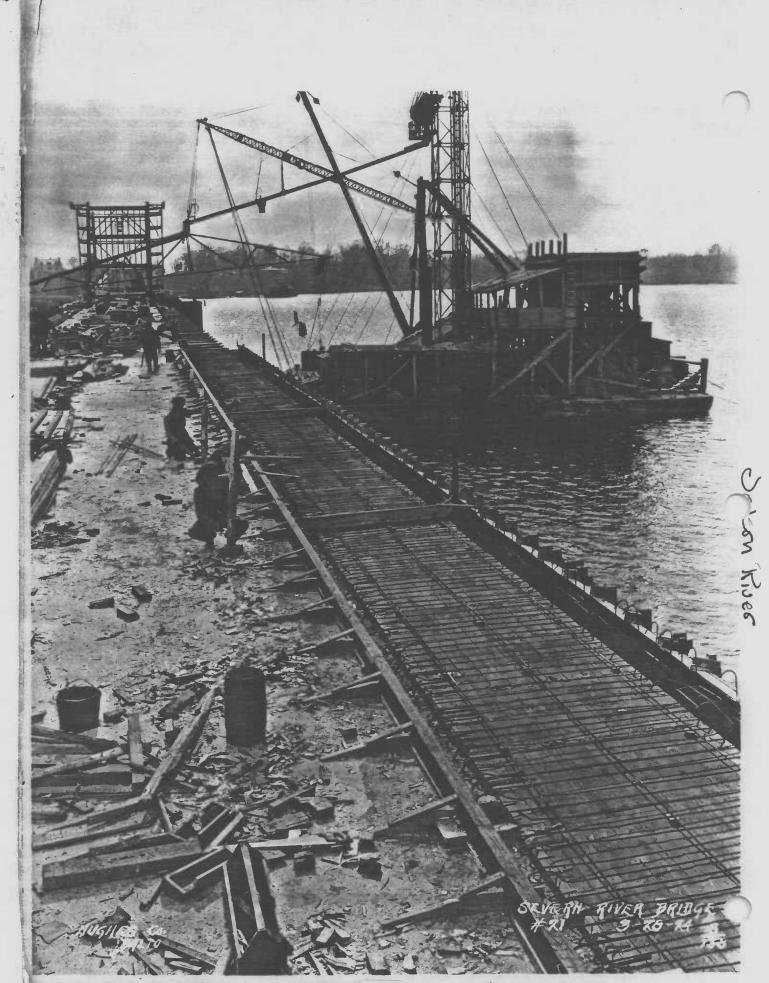




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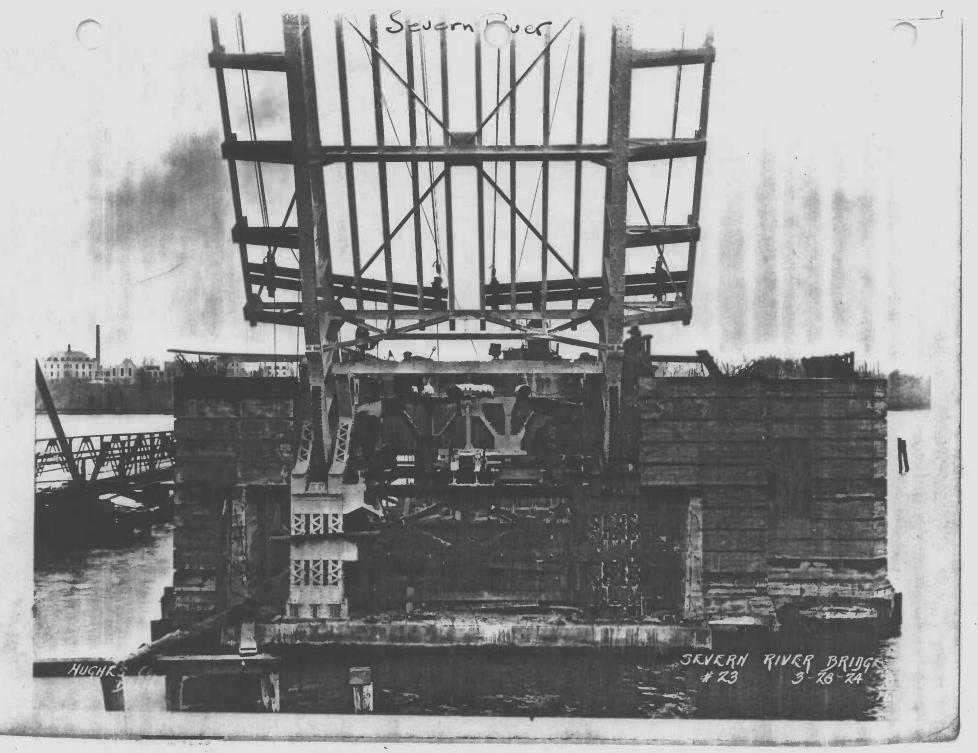


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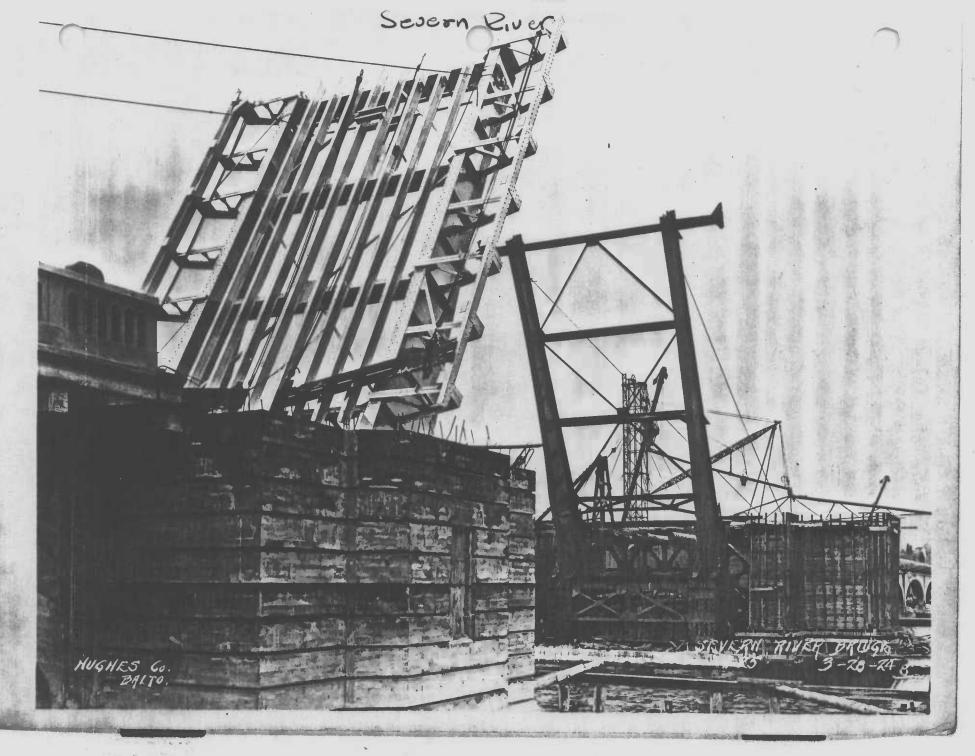


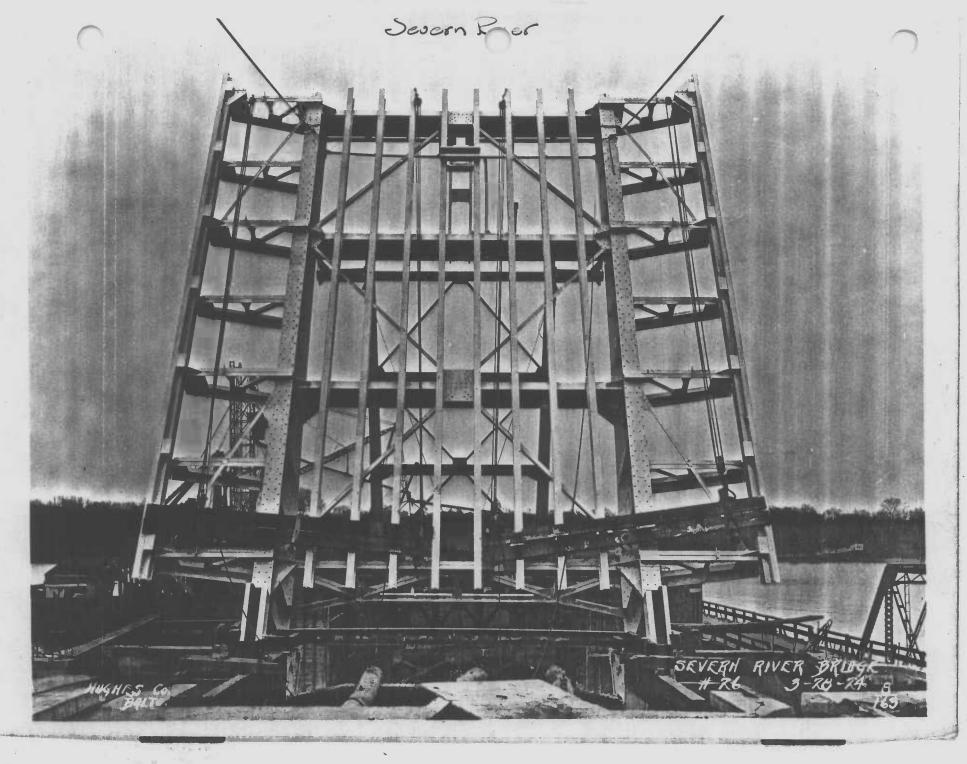
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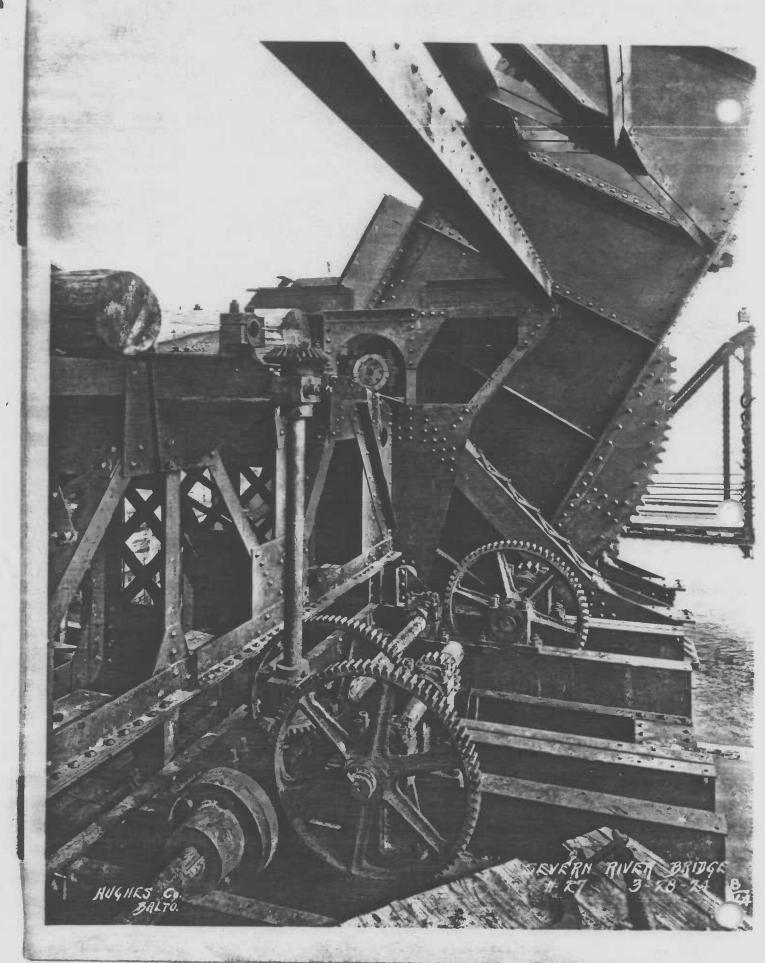
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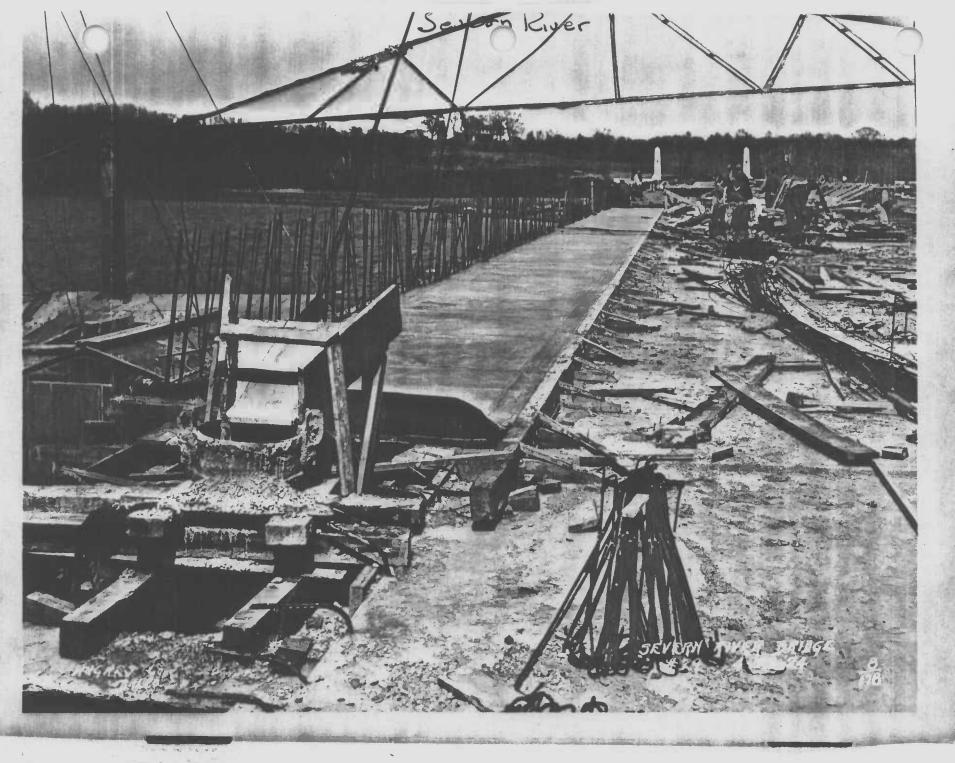
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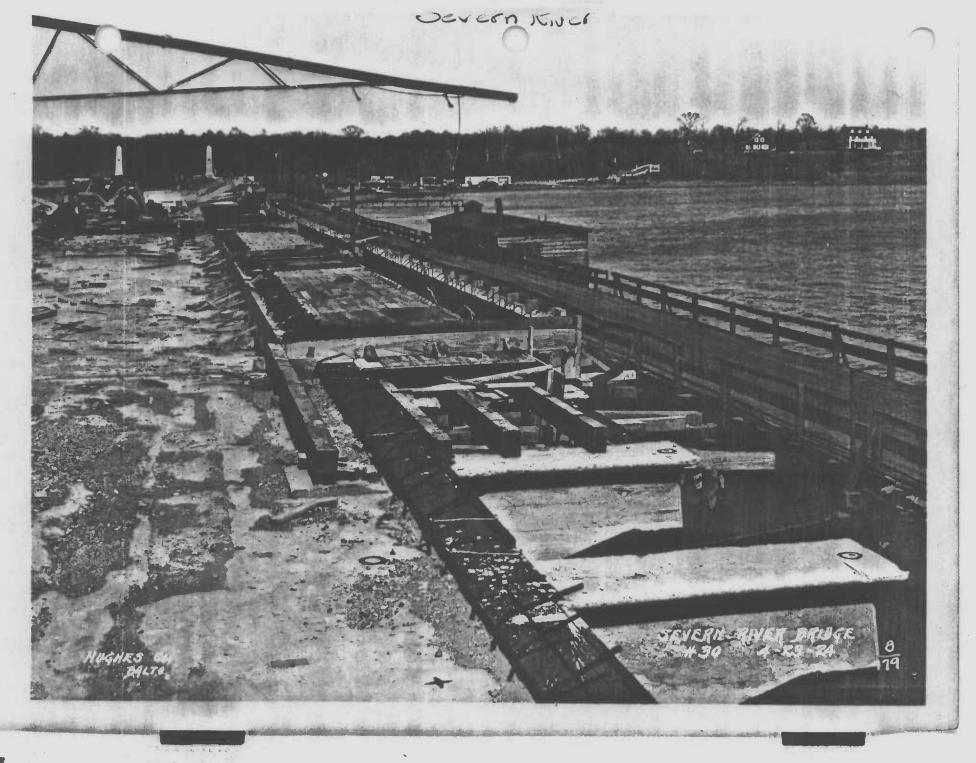




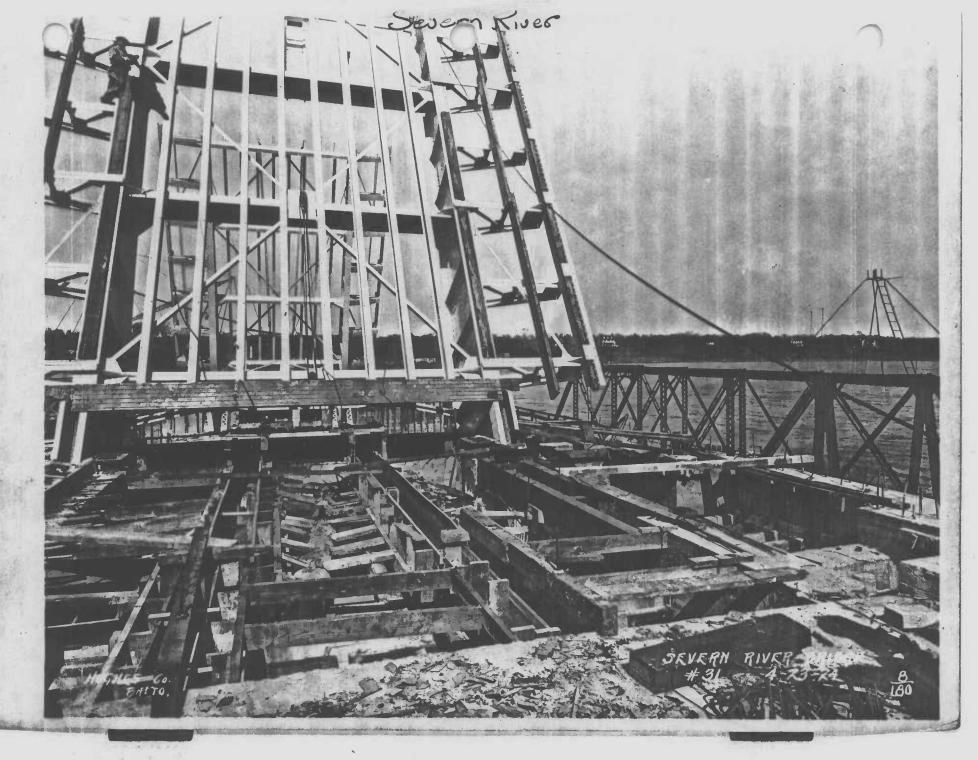
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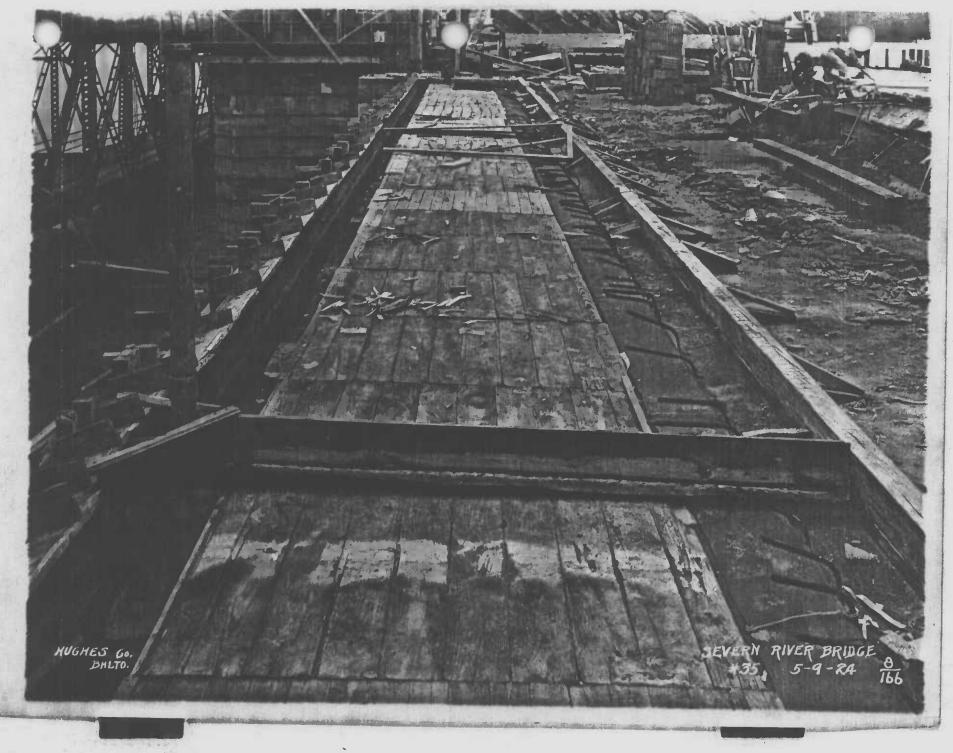


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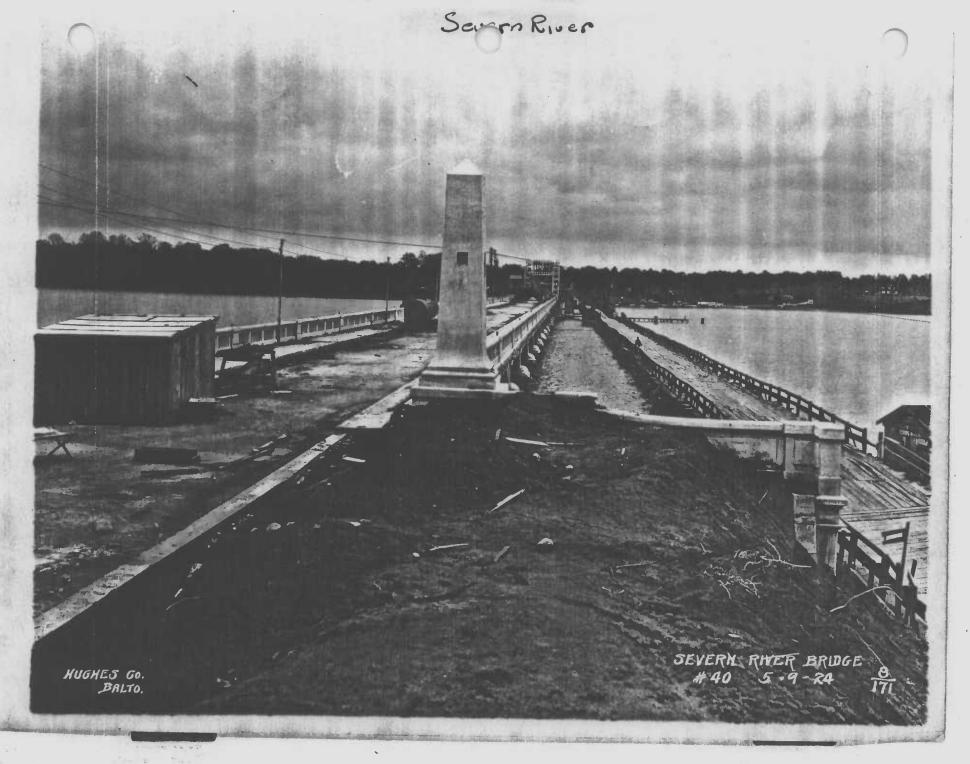
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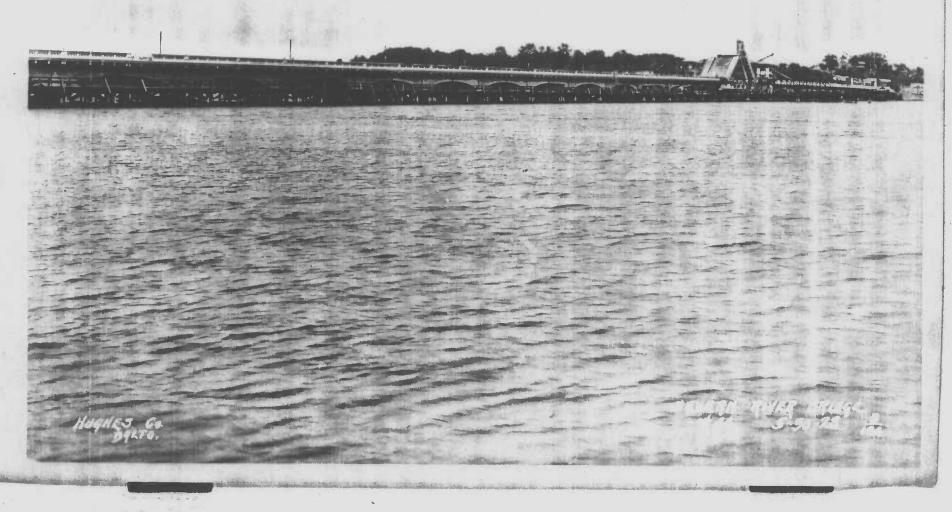


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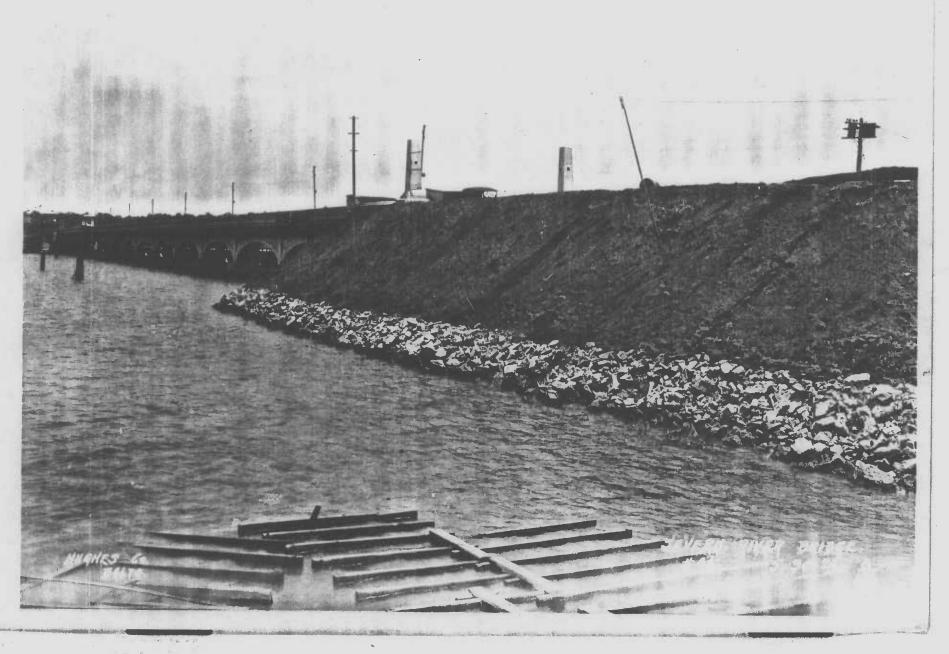
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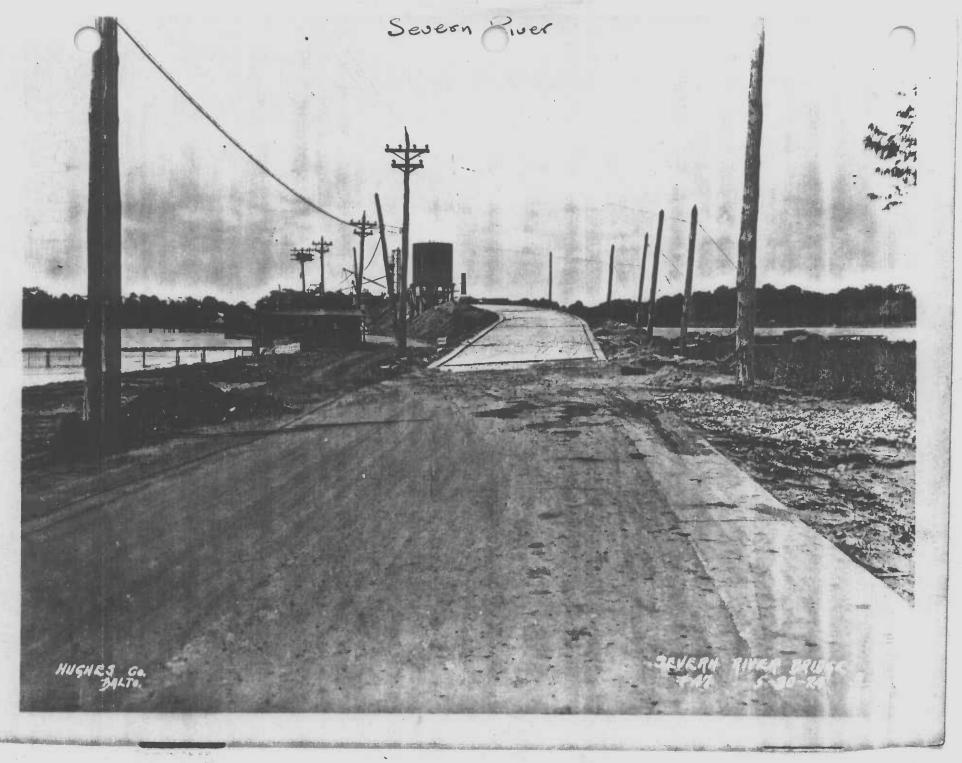
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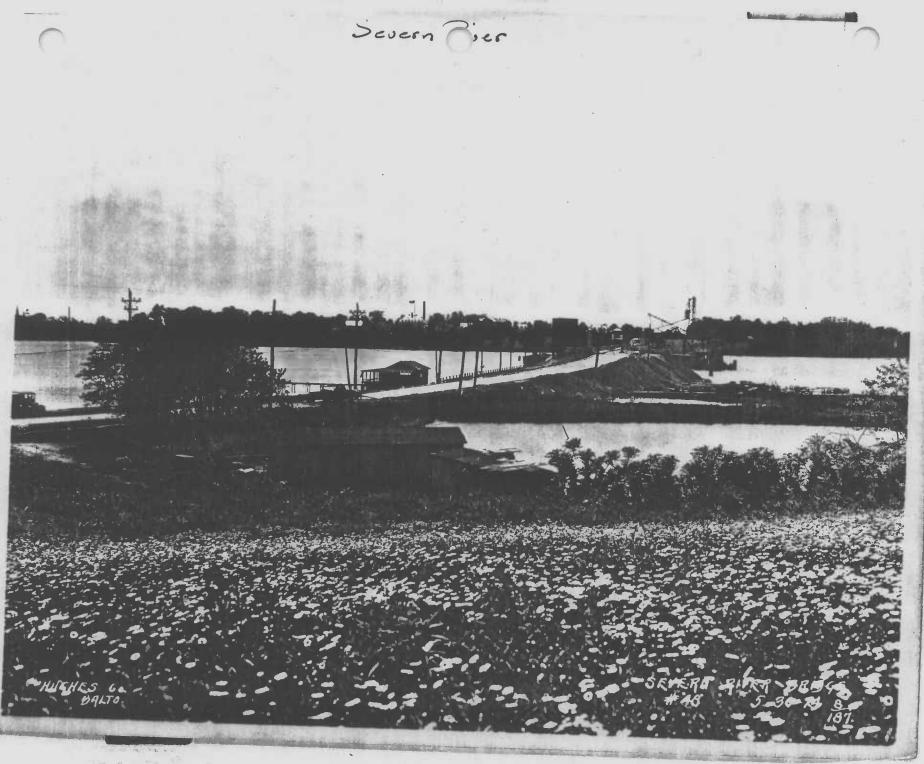
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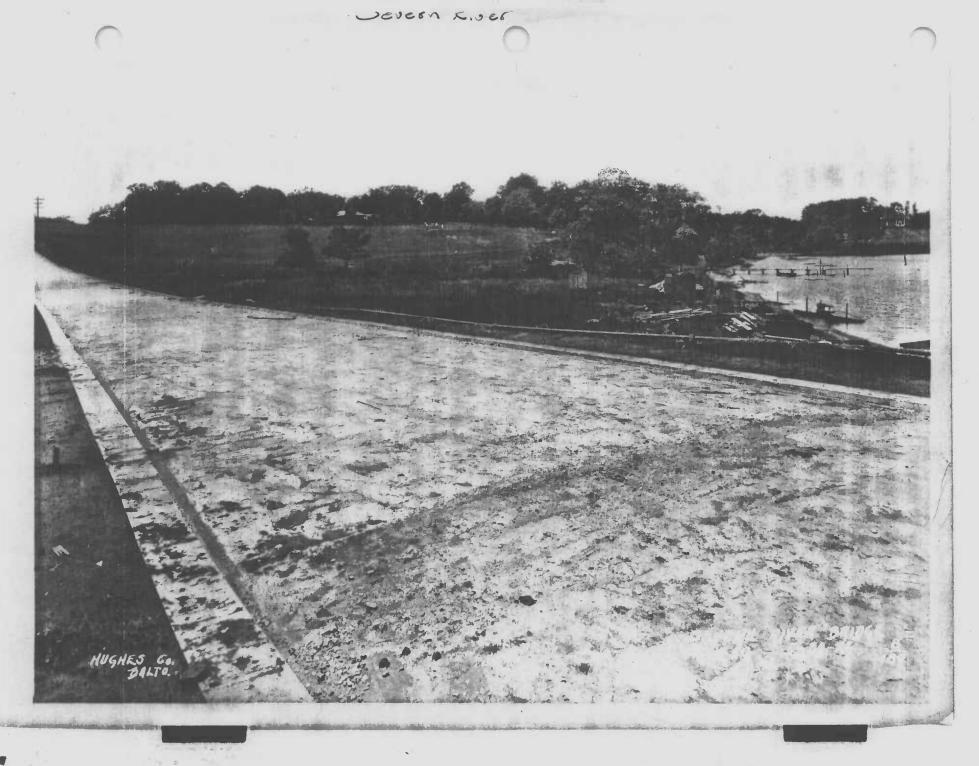


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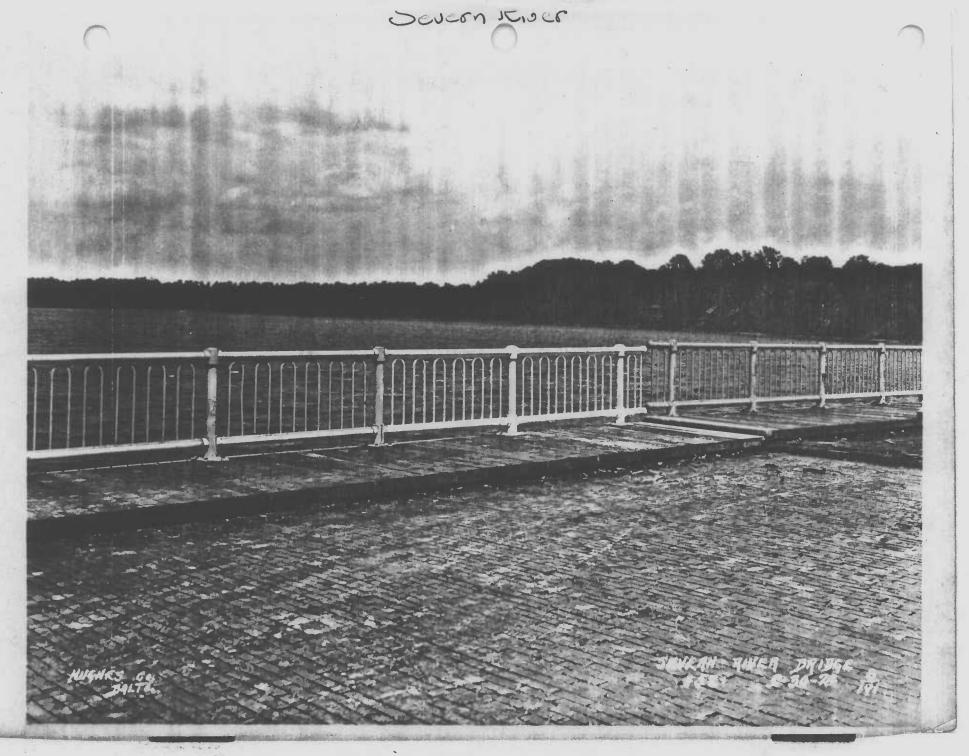


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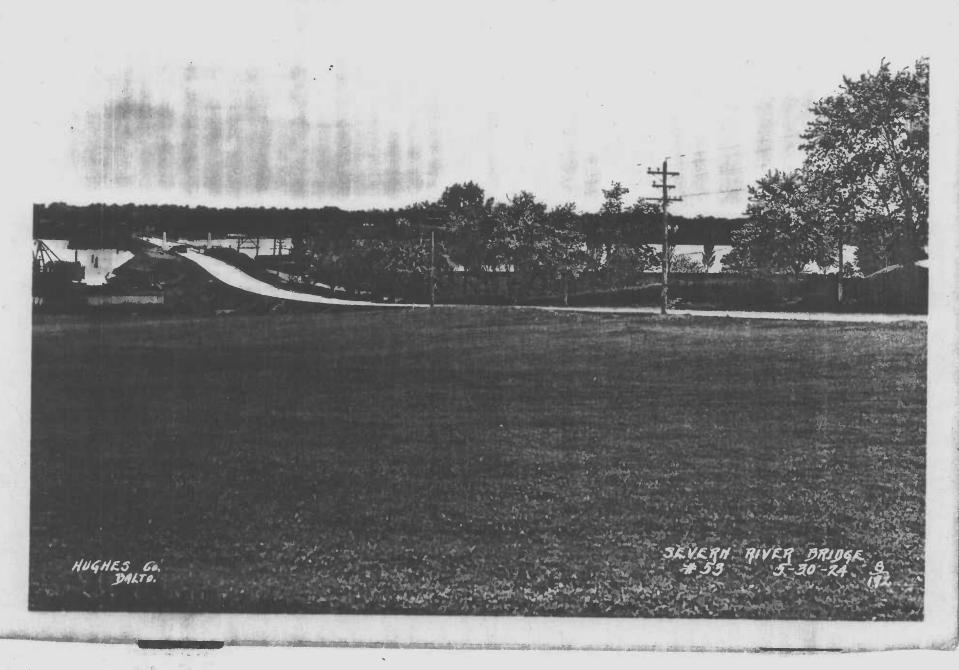
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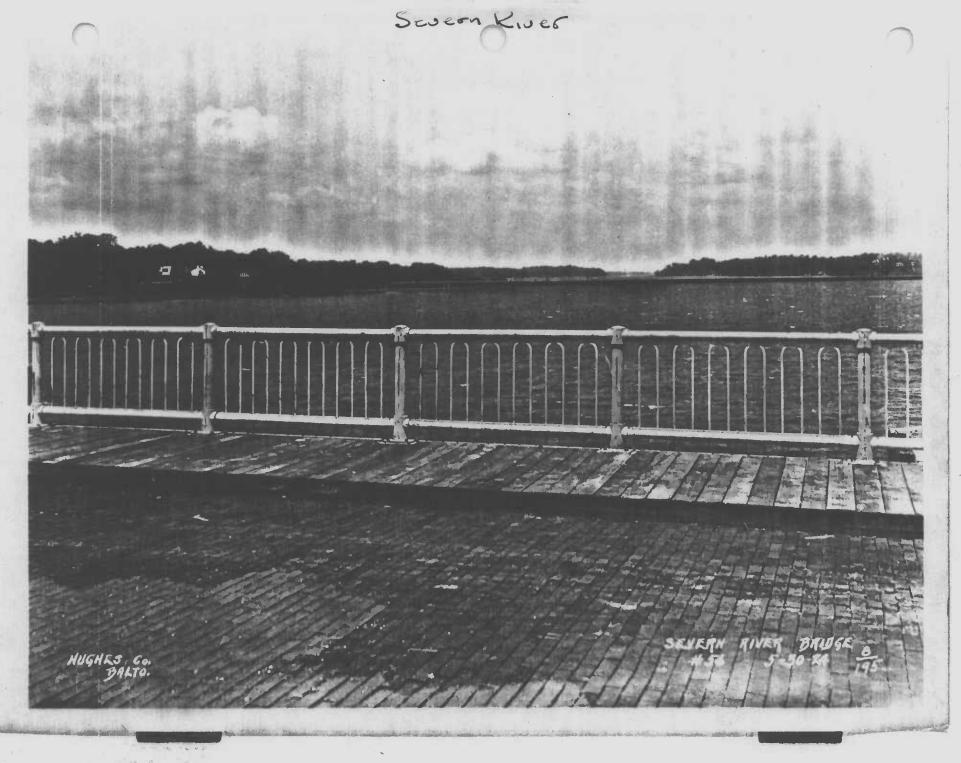
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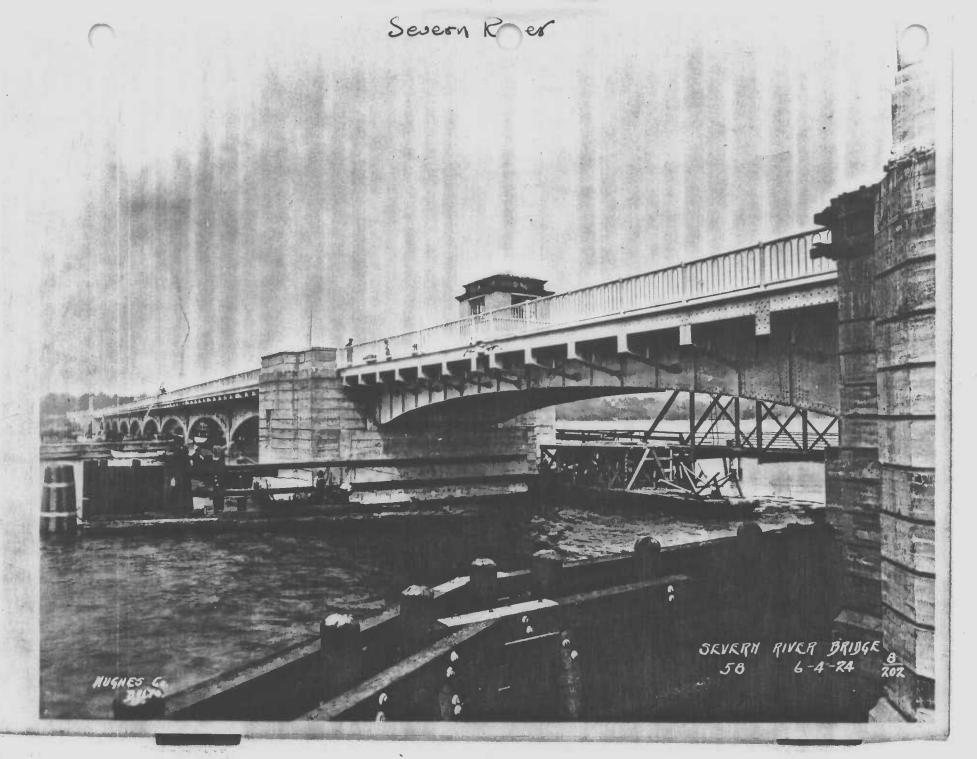




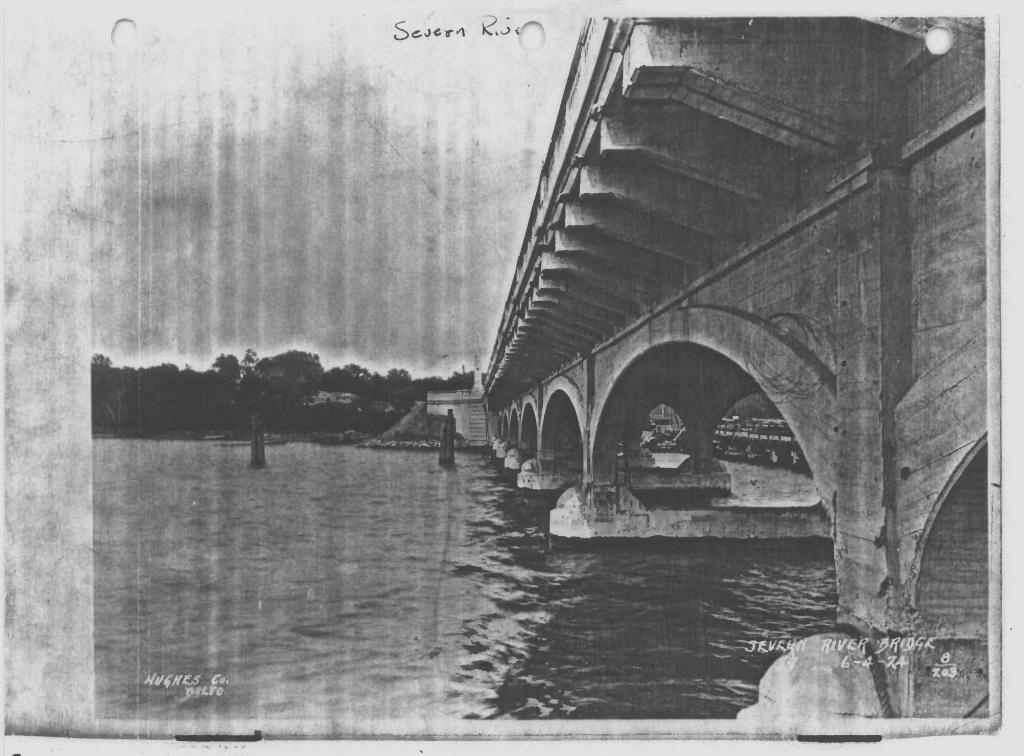
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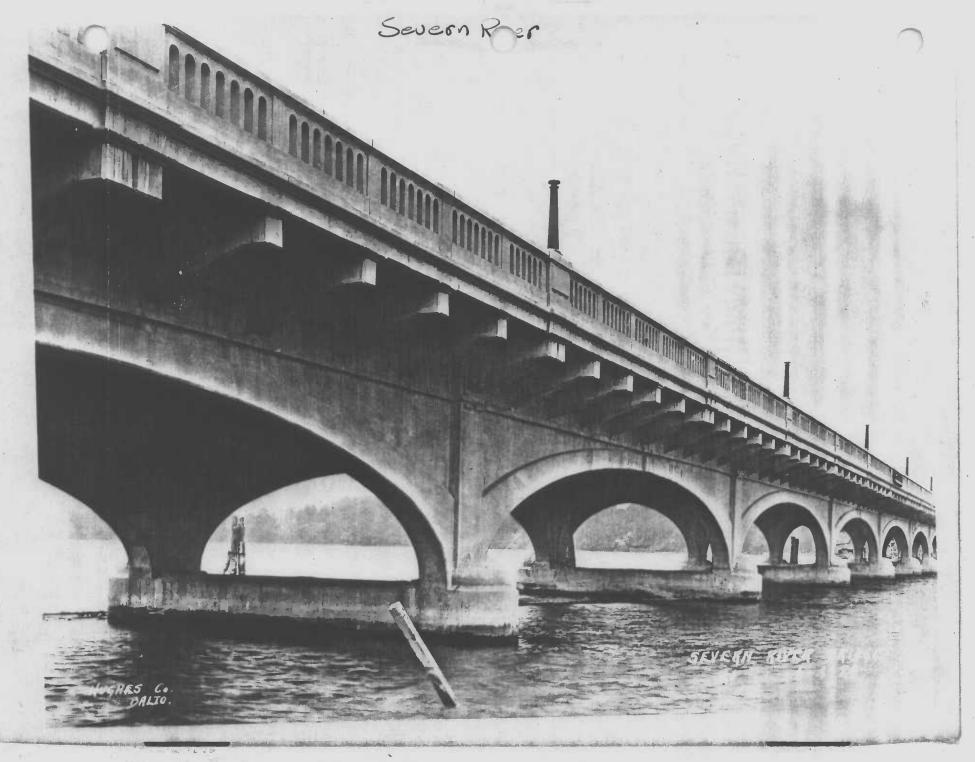


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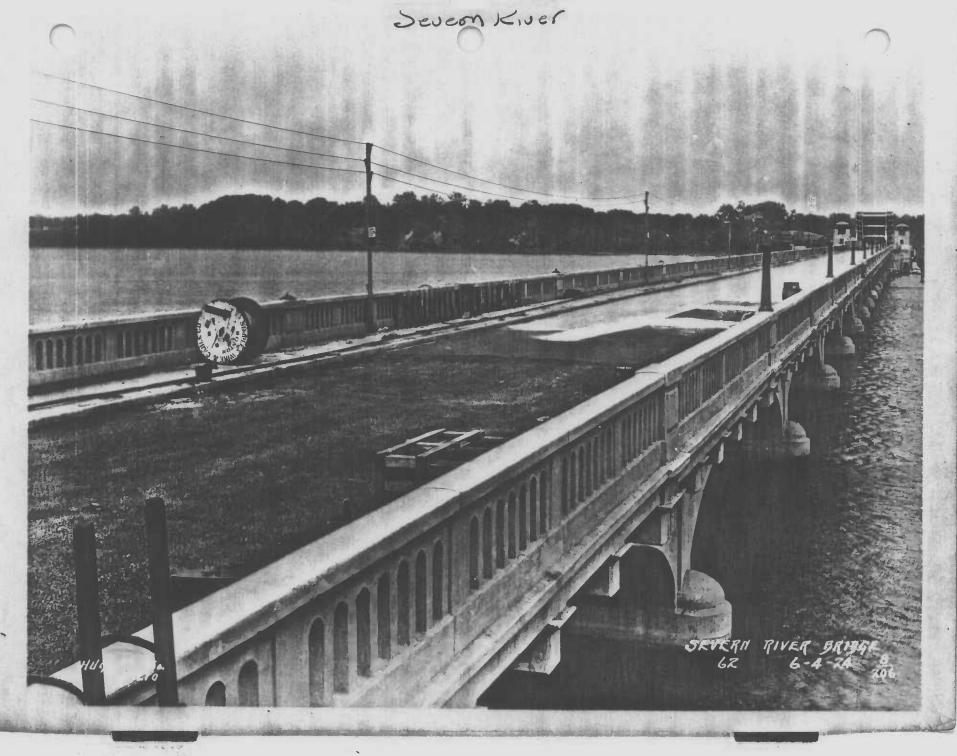


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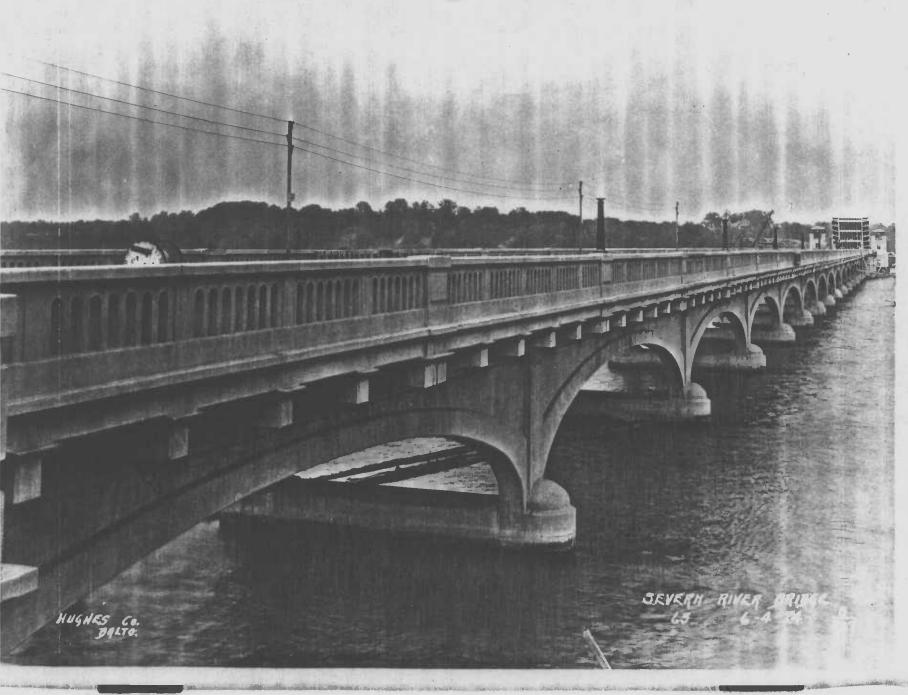




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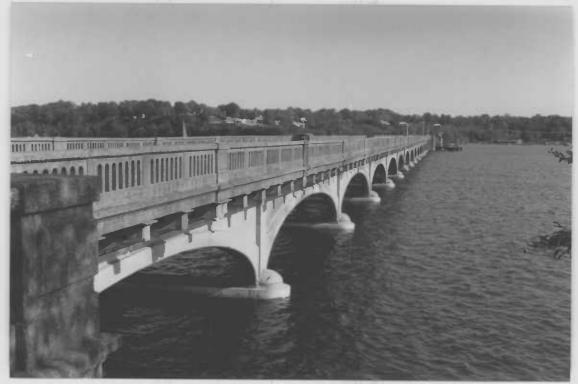
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OMAR O. CROTHERS D. C. WILEBRELER

L. H. STEUART-SECRETARY

AA-764 Swern River Br 30 Oct 91 R Anaveus



AA-764 Swern Lever Br 30 Oct 91 R. Andrews



AA -764 Swern River Br 30 Oct 91 & Andrews



AA-764 Swan River Br 30 Oxt 91 R. Andrews



AA-764 Sween River Br 31 Ox 91 & Anorems



AA-764 Swan Fiver Br 30 Oct 91 R. Andrews



AA-764 Severa River Br 30 Oct 91 & Andrews



AA-764 Severn River Br 30 Ox 91 Q. Andrews



5evern Rivar Br AA-764 30 Oct 91 RAndreum



AA-764 Sween River Br 30 Oxt 91 2 Avaren



AA. 76ct Swern Fiver Bo 30 Oct 91 RAndrews



AA-764 Swern River Ba 30 Ox 91 A Andrews



AA-764 Severn Brus Br 30 Ox 91 & Andrews



AA.764 Swern River Br 30 Oct 91 R Andrews



AA-764 Sever fiver Br 30 Oct 91 R Suchems



AA-764 Sween River Bo 30 Oct 91 R Andrews



9A-7-64 Gwern Fryw Br 30 oct 91 & Audulus



AA-764 Md 450/Severn River M/DOR Hnedak/Meyer November 1980



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